RUBBER WORLD

APRIL 1, 1942

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Processability of Stocks Containing Reclaimed Rubber Improved by the Use of RPA No. 3

THE INCREASED CONSUMPTION of reclaimed rubber and particularly its use in articles that heretofore have been made primarily from crude has made the life of many a technical or production man a continuous nightmare. The effect on processability of the substitution of reclaimed for crude rubber has been an important factor contributing to production delays. While stocks made from crude could be readily extruded or calendered and made into smooth-spreading cements, similar stocks made principally from reclaimed rubber caused real trouble. These problems can be largely avoided by the use of RPA No. 3 to peptize and smooth out reclaimed rubber.

RPA No. 3 should be mixed with reclaimed rubber in a Banbury Mixer or on a hot mill. Larger quantities of RPA No. 3 are required to effectively smooth out reclaimed rubber than is the case with crude, and its effectiveness depends to a considerable extent upon the free sulfur content of the reclaim. For initial investigations we suggest the use of 1.0% to 2.0% of RPA No. 3 on the rubber hydrocarbon in the reclaim; larger amounts may be required with reclaimed rubber having a high free sulfur content.

The advantages of RPA No. 3 over straight mastication in increasing the plasticity and in improving the processability of reclaimed rubber are shown in Table I below. One per cent of RPA No. 3 (on the rubber hydrocarbon content) was added to a whole tire reclaim having the following analysis:

Whole Tire Reclaim—

Specific Gravity	1.15
Rubber Hydrocarbon	55.0%
Acetone Extractable	11.34
Ash	16.55
Total Sulfur	1.81
Carbon Black	14.98
Alkalinity	0.44
Zinc Oxide	6.4

A hot mill (roll temperature 210°F to 240°F) was used.

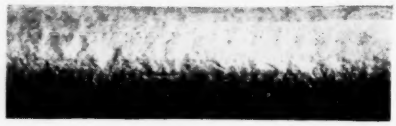
TABLE I
EFFECT OF MILLING WITH AND WITHOUT RPA NO. 3 ON THE PLASTICITY OF RECLAIMED RUBBER

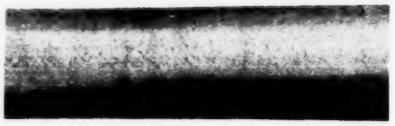
Milling Time Minutes	Plasticity-Recovery Without RPA No. 3	Plasticity-Recovery With 1.0% RPA No. 3
0	200-190	200-190
10	165-109	144- 80
15	154- 92	142- 77
20	153- 86	132- 66
30	149- 82	131- 62
45	141- 81	135- 65

From an examination of the data in Table I it can readily be seen that the use of RPA No. 3 gives these advantages:

1. It produces a softer, better processing material.
2. It reduces breakdown time. For example, a plasticity-recovery of 141-81 was reached in 10 to 15 minutes with 1.0% of RPA No. 3, but it required 45 minutes' milling to plasticize the reclaim to the same extent in the absence of RPA No. 3.

The photographs below illustrate the difference in extrusion qualities of stocks containing reclaimed rubber plasticized in the conventional manner and with RPA No. 3.





Following are the formulas for the compounds tested:

COMPOUND 1021	-20	-21
Whole Tire Reclaim....	181.0*	181.0*
RPA NO. 3.....	2.0	—
Carbonex S Plastic.....	15.0	15.0
Channel Black.....	20.0	20.0
Semi-reinforcing Black .	50.0	50.0
HELIOZONE.....	2.0	2.0
ACCELERATOR 808...	1.5	1.5
NEOZONE A.....	1.5	1.5
Zinc Oxide.....	3.0	3.0
Sulfur.....	3.0	3.0

*100 parts rubber hydrocarbon.

In order to make a stock that would extrude as smoothly as possible, 2% of RPA No. 3 was used in compound 1021-20.

Through the Mill

FREEZE RESISTING RUBBER compounds are becoming more and more important in the development of various products for special applications. For the best freeze resisting rubber the following compounding principles should be observed:

1. *Use minimum filler loading for desired hardness.*
2. *Select softeners least affected by low temperatures.*
3. *Accelerate with a thiuram and high sulfur to give a tight cure and high percentage of combined sulfur.*

We recommend the following acceleration on 100 parts of rubber to meet freeze resistant specifications:

Thionex . . 0.3 parts
Sulfur . . . . 3.0 parts

RECLAIMED RUBBER must now be used in a variety of products previously made wholly or to a large extent from crude rubber. The following accelerator combinations give excellent results with reclaimed rubber. The indicated quantities represent parts per 100 parts of rubber hydrocarbon in the compound.

	ACCELERATION	PARTS
1.	*Accelerator 808**	0.5
2.	*Thionex*	0.18
	Litharge	0.18
3.	*Zenite*	0.52
	DOTG	0.26
4.	*Zenite*	0.47
	Accelerator 808	0.19
5.	*2-MT*	0.5
	Retarder W	0.2
6.	*2-MT*	0.55
	Accelerator 808	0.1

**Accelerator 808 is retarded by high clay loading.*

BIBB WASHER compounds are described in a recent informal report. Both soft and hard rubber types are included.

RUBBER CHEMICALS DIVISION

Wilmington DU PONT *Delaware*

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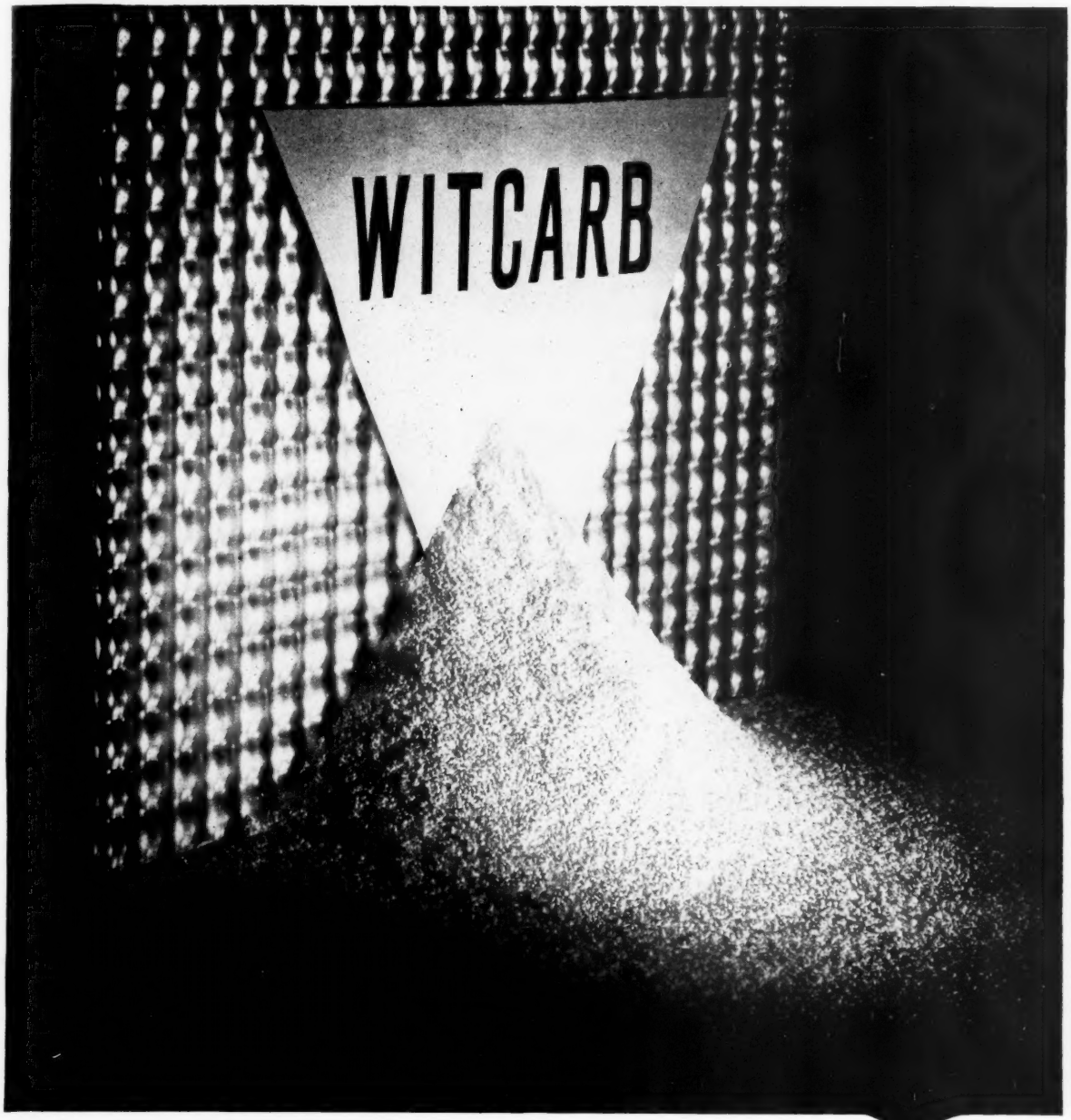

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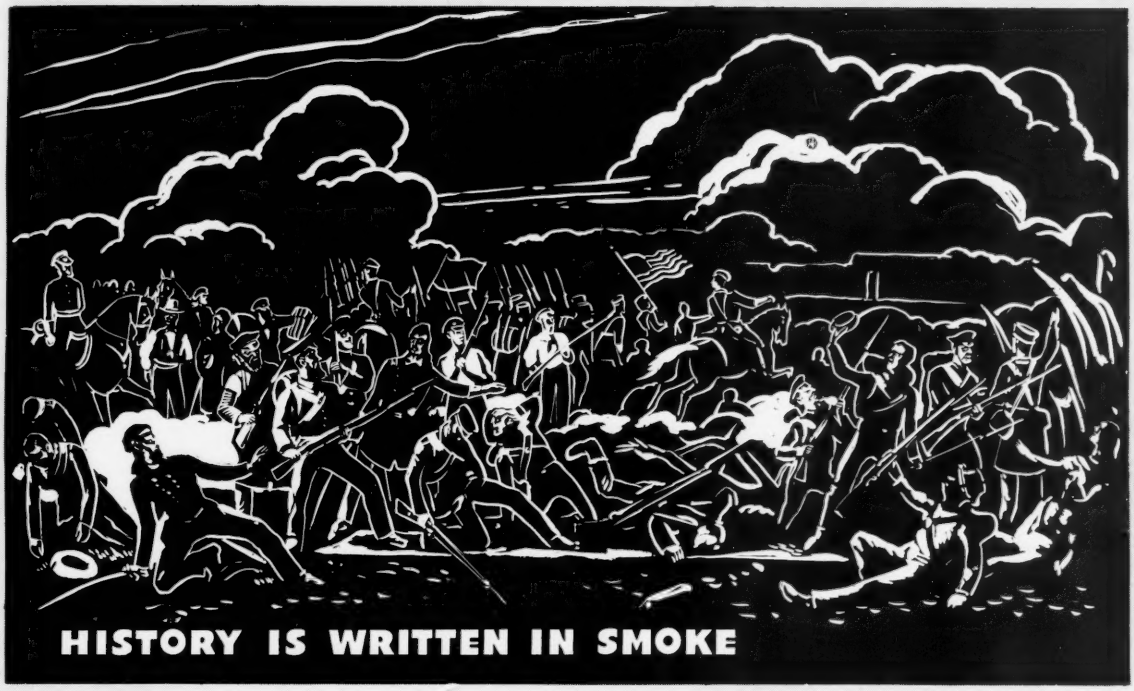

HISTORY IS WRITTEN IN SMOKE

Buena Vista—The Battle that Made a President

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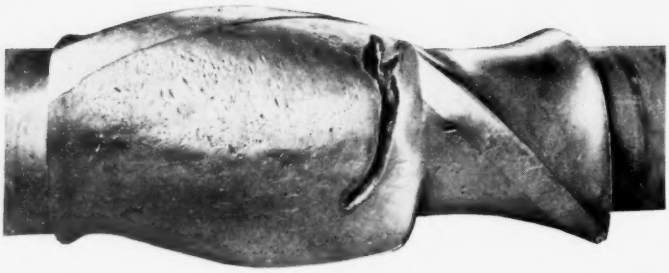

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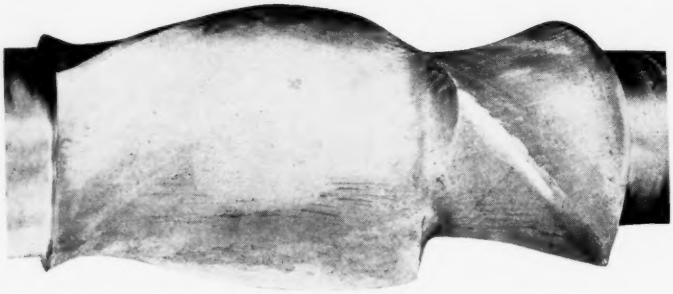

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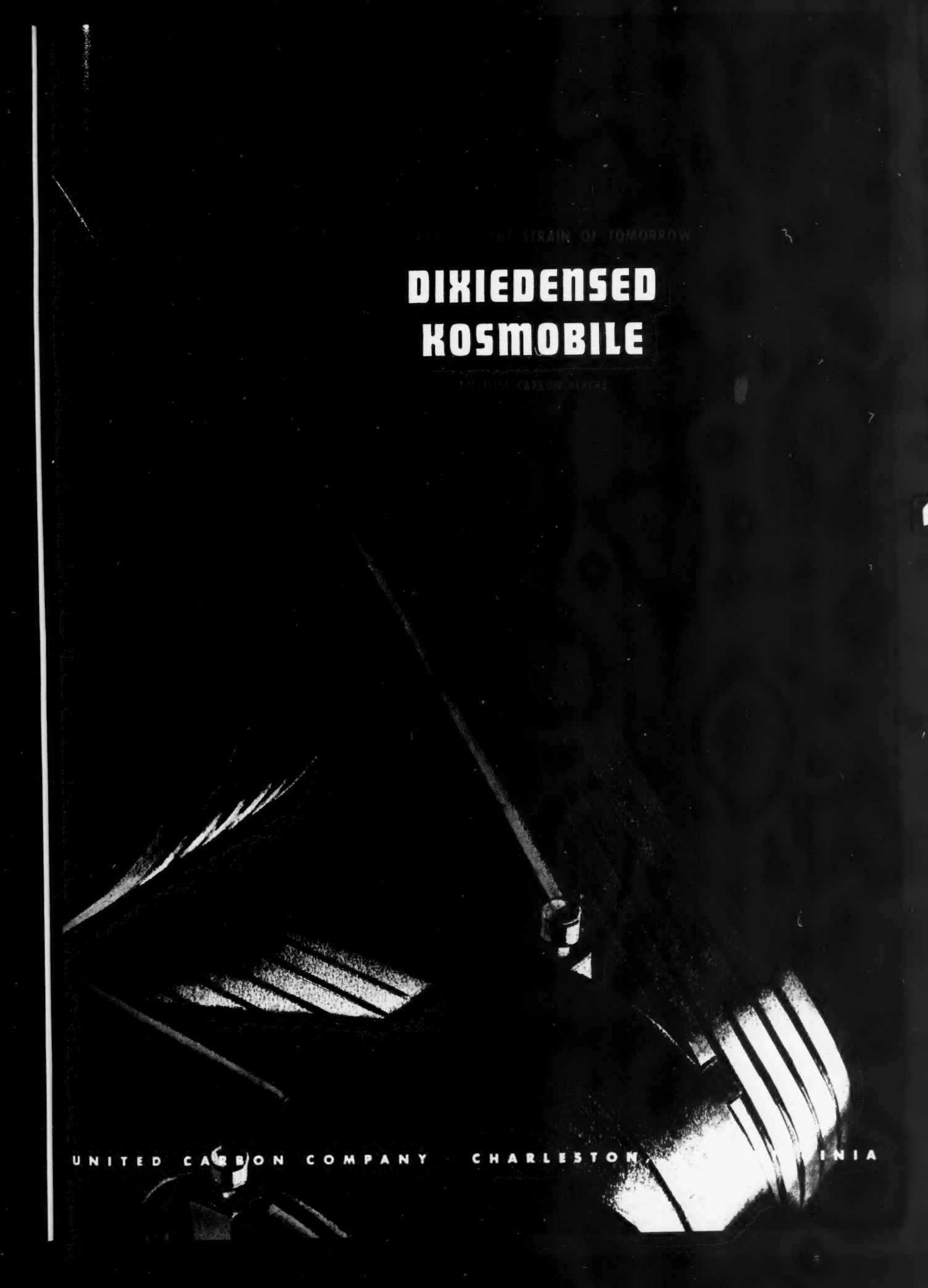
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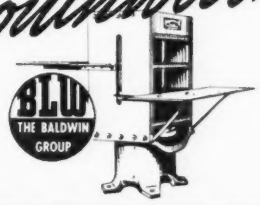

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*Patent Applied For

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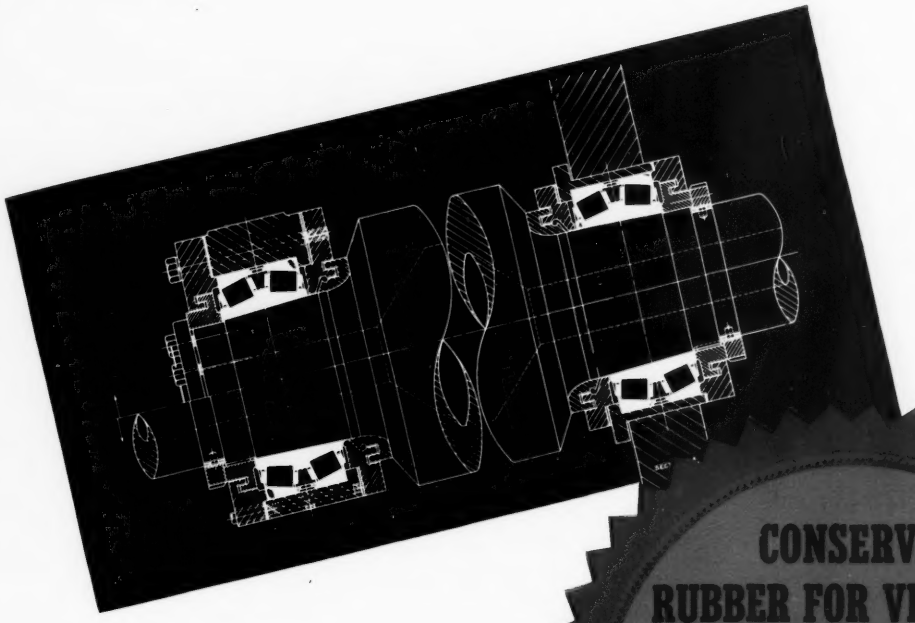

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VOLUME 106 NUMBER 1

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INDIA RUBBER WORLD

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Stickiness, Tackiness, and Spinnability

A Possible Molecular Interpretation . . . . .

D. Josefowitz[1] and H. Mark[1]

ONE particularly attractive branch of high polymeric chemistry is represented by a series of fairly successful attempts to correlate outstanding mechanical and electrical properties of macromolecular substances such as rubber, polyvinyl chloride, polystyrene, and cellulose with the size, shape, and internal flexibility of the long-chain molecules from which these materials are built up (1, 4, 10, 11, 13, 14, 18, 19, 24). Although a study of this type may not lead directly to the synthesis of entirely new materials with interesting and important properties, it may, however, give rise to information on how to modify the steps of the synthesis in order to obtain a material with more desirable properties.

Introduction

It seems reasonable to say that at present the most important physical properties of certain high polymers, such as modulus of elasticity, range of elastic extensibility, dielectric constant, and breaking strength, can be correlated with the molecular structure of those systems even with a certain degree of numerical exactness. It is, for example, possible to understand why the modulus of elasticity of rubber, polyisobutylene, and polybutadiene derivatives is of the order of magnitude between 10^6 and 10^7 dynes per square centimeter; why the modulus increases with temperature and with elongation; and why this property finally—in the completely extended state—reaches values between 10^{10} and 10^{11} dynes per square centimeter (1, 30). It is equally possible to understand why the strength of an unoriented and moderately crystallized filament of such materials as regenerated cellulose, polyesters, polyamides, or polyvinyl derivatives is between one gram and two grams per denier, and why with increasing orientation and crystallization this value increases to above five grams per denier (23, 24). In these and similar cases quantitative relations between structure and properties are obtained, which, although still approximate and of limited accuracy, indicate that the accepted conceptions and ideas concerning structural principles are not too far from the truth.

It must be emphasized, however, that only a very few of the most simple characteristics of these high polymers are amenable to such a semi-numerical treatment; while the majority of the physical properties must still be dealt with in a more qualitative and descriptive way. Yet a merely qualitative discussion may be of some value, particularly if the discussion is not limited to special cases and if it deals with a general characteristic which may be found in many of the high polymeric systems and which can be varied over a wide range of magnitude. One outstanding and general characteristic of this type is the capability of high polymers both to produce solutions with distinct spinnability (8) and to exhibit a strong tendency toward tackiness.

It should be pointed out clearly in this connection that at present no satisfactory method is available to obtain reproducible numerical values for the properties just cited. Our knowledge is still in an empirical and descriptive state, in which different terms such as spinnability, drawability, extrudability, or as stickiness, tackiness, and adhesion are used to express more or less the same general intrinsic characteristic of a given substance, without going into quantitative details. As this is the case, we shall in this article use the above expressions interchangeably and synonomously.

While the properties mentioned previously—elastic modulus, tensile strength, etc.—appear to be mainly dependent upon the average total length of the chain molecules, it seems that tackiness and extrudability are influenced not so much by this total length of the macromolecules, but by the average length of the easily movable segments of the chains and by the intermolecular forces of these segments.

It is the purpose of this brief article (a) to propose a molecular picture for that intrinsic behavior which may be described under the terms of stickiness, tackiness, easy adhesion, spinnability, drawability, etc., and (b) to try to check this proposal with the aid of recent studies in the field of cellulose derivatives and of rubber.

[1] Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

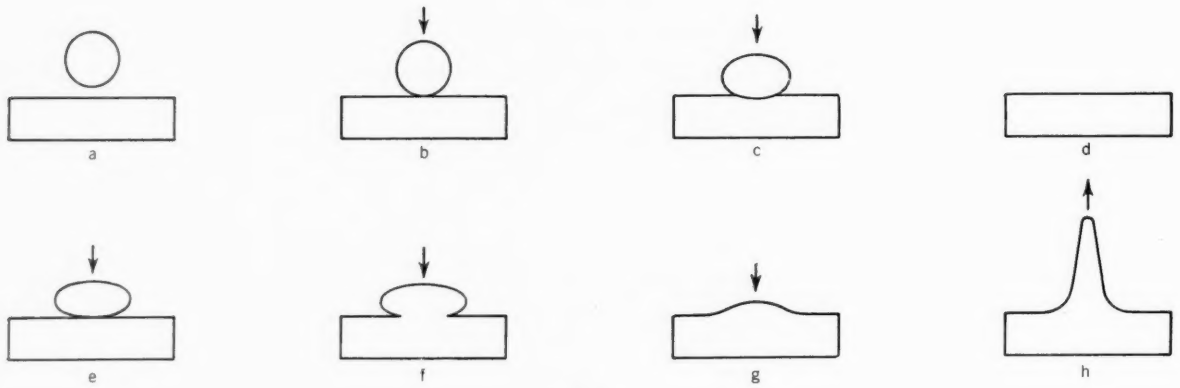

Fig. 1

General Molecular Structure and Its Relation to Stickiness

To obtain a preliminary idea as to what is meant by the stickiness of high polymers, let us consider the following experiment. Suppose we have a substance which we want to investigate in respect to its tackiness, such as asphalt, rubber, or polyacrylic ester. We then make a plate out of part of the sample and a small sphere out of the rest, as shown in Figure 1a. Next we place the ball on the plate and exert a certain pressure on it perpendicular to the plane of the plate (Figure 1b). If steel or ordinary glass is used for this experiment, even rather high pressures such as 100 or 1,000 pounds per square inch will not change the general arrangement of the system as shown in Figure 1b; the plate and the sphere will change their shape only very slightly; no adhesion or sticking whatsoever will take place.

If the experiment is repeated with a plate and a ball made from a vulcanized tire compound and a pressure of about 50 pounds per square inch is applied, we will find conditions as shown in Figure 1c. Both plate and ball will undergo a visible elastic deformation, which, however, will disappear completely and instantaneously as soon as the pressure is released. No adhesion or sticking takes place unless the pressure is very high or the temperature is considerably elevated. These two cases are characteristic for typically elastic substances which do not exhibit viscous flow.

Let us now repeat the experiment with a liquid, say alcohol or water. Owing to the surface tension it is possible to place a drop of such a liquid on a plane surface of the same material just as shown in Figure 1b. However as soon as a slight pressure is applied, the ball will disappear and merge completely with the liquid surface, which represents the plate (Figure 1d). We have here the other extreme case: namely, a Newtonian liquid of low viscosity (about 2×10^{-2} poises). In this case only one characteristic property of stickiness: namely, quick combining or merging under the influence of comparatively small pressures is exhibited, but this is shown to a very high degree. Nevertheless this system would not be considered as being typical of stickiness because an equivalent drop of liquid can be very easily removed again from the system. A force corresponding to the specific surface tension (50 dynes per centimeter) is all that is necessary to produce again a ball of the same size as the one which disappeared and to separate it from the surface. Such fluids show no tackiness and no spinnability.

If, finally, the experiment is carried out at about 50° C. with a ball of soft rubber or pitch on a surface of the same material, the condition shown in Figure 1b will first prevail. A small pressure (five to ten pounds per square inch), however, will cause this to change into what is represented in Figure 1e; and if the pressure and the temperature are high enough or if the time period is sufficiently great, the condition will change to that of Figure 1f and finally 1g. It may be observed that merging takes place again, although not so fast as in the case of water or alcohol. This is due to the fact that the new system has a considerably higher viscosity (10^3 or 10^4 poises as compared with 10^{-2}) and also the fact that we are not dealing with a Newtonian liquid, but a more complicated system. If an attempt is now made to remove the drop or ball again by pulling it upward, as shown in Figure 1h, we find that we cannot again obtain a spherical drop (as in the case of a normal liquid), but instead a filament is produced. A considerable force is necessary to draw this filament out of the material, a force much larger than the surface tension to be overcome. Even to move the protrusion of Figure 1g parallel to the surface would require quite a considerable force.

Systems which behave typically as shown in Figure 1e to 1h are considered as exhibiting stickiness, tackiness, and spinnability; they have two main characteristics:

(a) They merge fairly rapidly at room or slightly elevated temperature and at small pressures.

(b) They show a certain resistance to forces of stress and shear if an attempt is made to separate them again.

Such systems are in respect to their behavior somewhat intermediate between elastic solids and viscous liquids, and it is easy to understand that there is a very wide range as to the extent each of the two above conditions are fufilled. Stickiness, tackiness, and spinnability are to a large extent matters of degree, and a small increase in temperature or a few per cent. of a plasticizer can very distinctly change these characteristic properties of a substance.

In considering the two conditions in more detail, it may be first pointed out that the quality of stickiness, tackiness, or spinnability completely disappears at sufficiently low temperatures. A solution of rubber in benzene, which is distinctly sticky at room temperatures or slightly below, becomes hard and brittle at the temperature of dry ice; while, on the other hand, alcohols and glycols show typical stickiness at temperatures of about –40° C. which in turn disappears again at still lower temperatures. This point proves that a certain degree of molecular mobility is essential to produce stickiness, which is exactly what one would expect in order to fulfill condition (a) above.

A convenient measure for the ease with which the molecules of a substance or certain parts of these molecules can move and eventually adapt themselves to the influence

of an external force (such as the pressure in Figure 1b) is the *viscosity* of the substance. Viscosities are usually measured in poises, a unit which was chosen because it relates closely to the experimental procedure by which the viscosity is determined. For our purposes, however, it will be better to have the viscosity expressed by a quantity which refers more directly to the molecules themselves and their behavior. This quantity is the so-called *time of relaxation*, which is a measure of the average time required by a molecule to relax (by shifting its place or by turning around) into an unstrained condition while under the influence of an external stress.

TABLE 1. APPROXIMATE VISCOSITIES AND TIMES OF RELAXATION OF SOME TYPICAL MATERIALS

Substance	Viscosity η in Poises	γ Time of Relaxation in Seconds
Pentane	10^{-2}	10^{-13}
Water	2×10^{-2}	10^{-13}
Olive oil	1	10^{-12}
Glycerol	2×10^{4}	10^{-10}
Heavy motor oil	10^{2}	10^{-10}
Spinning solutions	10^{2} - 10^{3}	10^{-9}
Injection molding compound	2×10^{4}	10^{-7}
Glass blowing compound	10^{5} - 10^{6}	10^{-6}

Table 1 shows the values for the viscosities of certain typical fluids and the corresponding values for the times of relaxation. It can be seen that normal liquids, such as pentane or water relax very rapidly ($\gamma = 10^{-13}$ seconds; $\eta = 10^{-2}$ poises), which is due to the fact that small molecules can rotate, oscillate, or shift their position in a very short time. In the case of larger molecules, in particular those with longer chains, the response of the molecules to an external force slows down quite considerably. Experiments (4, 10, 14, 19) as well as theoretical considerations have shown that the logarithm of the viscosity is proportional to the square root of the number n of monomeric links in the chain,

$$\log \eta = a + b\, n^{1/2}$$

For longer chains (n above a hundred) one can neglect the influence of the first term and obtain the logarithm of viscosity as being directly proportional to the square root of the polymerization degree; chains of a thousand links have in the molten state a viscosity that is 1,000 times higher than chains of a hundred links. Thus the above equation represents a very rapid rise in viscosity and hence of time of relaxation with chain length.

If we now consider a certain system, say a solution of cellulose nitrate in acetone and start with a very high degree of dilution (e.g., 0.5% by weight), we find a viscosity of about 10^{-1} poises and no distinct stickiness. By increasing the concentration to 20%, the viscosity rises to about 1,000 poises, and a distinct stickiness can be observed. At still higher concentrations (about 30%) a gel results with a viscosity of about 10^{6} poises, which no longer exhibits stickiness or spinnability. Similar observations can be made on other very different systems, such as natural and synthetic rubber, cellulose derivatives, vinyl polymers, inorganic glasses, and asphalt. It seems, therefore, that typical stickiness is somehow related to viscosities between 100 and 10,000 poises or with relaxation times between 10^{-7} and 10^{-4} seconds. The chain-like molecules or their parts must have a certain mobility in order to fulfill condition (a) and to merge easily with each other. But they must not slip *too easily* along each other in order to comply with condition (b), which requires a certain resistance to stress and shear. As a matter of fact, many chain polymers (vinyl derivatives, polyesters, polyhydrocarbons, and rubber) show a range of oily consistence [polymerization degree (PD) below 50] without stickiness. Then follows a range (PD = 50 to 300) of a more viscous, typically sticky, and spinnable condition, above which (PD higher than 300) the materials become tough and hard and no longer adhere.

It seems, therefore, that the following condition for stickiness, tackiness, or spinnability might be suggested: that these phenomena are related to the presence of easily movable chain segments or chain ends of an average length of about a hundred links (PD = 100). If their length is shorter, the chains merge, but their mutual forces are too small to prevent slippage; if their length is much greater, the chains adhere considerably to each other, and therefore merging is not readily accomplished when two like samples are brought into contact with each other.

In order to check the above criteria, let us discuss some conditions which (1) favor stickiness, such as: (a) temperature increase, (b) degradation, (c) presence of solvent or plasticizer; and then some conditions (2) which destroy stickiness, such as: (d) temperature decrease, (e) cross-linking and gelation, (f) crystallization.

(a) Under given conditions, temperature increases the Brownian movement of the molecular chains and their segments and favors merging. Later—after close connection has been established—it may be desirable to decrease the temperature in order to prevent slippage of the chains along each other. This is one principle of welding, soldering, and cementing.

(b) Certain natural and synthetic materials do not exhibit excessive stickiness because their chains are not isolated and freely movable, but are somehow bundled up and connected with each other. This connection can be effected by strong covalent cross-links (in vulcanized or cyclicized rubber, in certain polybutadiene derivatives), or by hydrogen bridges (in certain proteins and polyamides), or by strong intermolecular dipole forces (in cellulose and polyvinyl derivatives). To render such systems sticky it is necessary to break up these connections and to make the chain-ends and mobile segments free and available for the fulfillment of condition (a). It is well known that in many cases a certain amount of degradation which breaks the bridges and opens the connections increases the stickiness and spinnability.

(c) In the plain (dry and unplasticized) state intermolecular attraction can immobilize the chain-ends and attach them to or incorporate them with crystallized areas so that their free motion is greatly decreased. The addition of a low molecular weight substance such as a solvent or a plasticizer, which enters and loosens up mainly the uncrystallized or less organized areas of the material, decreases locally the viscosity and hence brings about the easy mobility of the chain-ends and chain-segments, which is necessary to develop stickiness and spinnability. After intimate contact has been established, the removal of the solvent prevents the connected chains from slipping too easily along each other. This is another principle of cementing and glueing.

(d) Temperature decrease after contact has been established has already been mentioned under (a) as a means of improving resistance to stress or shear.

(e) Cross-linking (vulcanization) and gelation (denaturation and coagulation) represent the establishment of intermolecular connections and hence immobilize movable chains or their parts to counteract sticking.

(f) If two substances are chemically identical or similar, but have different stereochemical configuration, such as rubber and gutta percha, or cellulose and starch, then the ones with the more puckered or branched chains (rubber and starch) are stickier; while the other isomers, having straighter chains, which fit easier into a crystal lattice and therefore show a preferred tendency for crystallization, are distinctly less sticky (gutta percha and cellulose). If the tendency toward crystallization is decreased by irregular substitution (partial nitration or

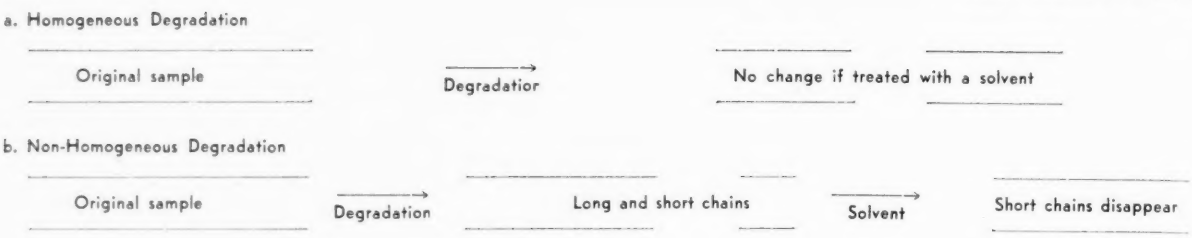

Fig. 2

acetylation) or by copolymerization or the number of available free chain-ends is increased by appropriate degradation, a fairly distinct amount of stickiness is developed.

This brief review of the most important factors which favor and disfavor stickiness seems to be, to a certain extent, support for the hypothesis formulated above: i.e., that the presence of free and mobile chain-ends is somehow connected with stickiness and spinnability.

Tackiness of Rubber and Rubber-Like Materials

In the foregoing we have tried to develop a general explanation for the mechanism of stickiness, tackiness, and spinnability. These properties are all of considerable interest for the processing of high polymers in various industries and particularly in the manufacture of rubber and rubber-like materials. In the following we shall, therefore, attempt to discuss some specific examples in connection with natural and synthetic rubbers.

Only few experiments have been reported which give numerical values for the stickiness of such materials. Griffith and Jones (16) developed an apparatus which allowed the measurement of the actual force required to separate two rubber surfaces which had been in contact for a definite time at a definite temperature and under a definite pressure. They investigated samples of unvulcanized natural rubber, and their results indicate a rather regular dependency of the tackiness on such variables as time of mastication and temperature.

Most authors to date have treated the subject in a more qualitative fashion; hence only few numerical data are available on this subject.

Let us consider a sample of rubber in the swollen state. It contains a relatively large amount of solvent, which surrounds the chains and loosens up the internal structure. Chain-segments and ends which are immobilized in the dry state by secondary valence forces are now free to move because of the dispersing action of the solvent. Therefore the material will be very tacky. If the same sample is now shrunk and dried to its natural unswollen state, it will be only moderately tacky under normal conditions as the mobility of the chain-ends is now considerably reduced. If the sample is then stretched, a certain amount of crystallization takes place, and the chains become alined and parallel to the direction of stretch. The free chain-ends will nearly all be incorporated in the crystalline lattice, and thus hardly any of them will be free and available. If the sample finally is frozen in this stretched state, a complete stiffening of the structure takes place. From these considerations we can see why a stretched piece of rubber shows hardly any tackiness and why, when frozen in that state, it loses all characteristics of tackiness.

In the case of butadiene rubber-like materials the situation is somewhat different. Such materials are cross-linked and interwoven, and they therefore possess a relatively small number of available end groups, even at normal conditions. This cross-linking is presumably responsible for their non-sticky character. A somewhat similar situation exists in the case of vulcanized rubber.

From the above examples it would appear that the easiest way of obtaining a more sticky behavior would be to swell the material with an adequate solvent. This point is true in many cases, but it is not a technical solution of the question inasmuch as the use of large amounts of solvents would be costly and impracticable.

To produce or increase tackiness one uses either one single or a combination of the following three ways: (1) degradation, (2) tackifying binding agents, (3) reduction of cross-linking.

The tackiness of natural rubber is mainly developed during mastication and appears to be nearly always due to an oxidation reaction which is followed by a shortening of the chains. Light, certain metals, and acids cause a similar degradation, but it has been shown by Blake and Bruce (5), Esch (9), Garner (14), Morgan (26), and others that this degradation occurs rarely or not at all in the absence of oxygen. Therefore the influence of these substances as well as of light probably catalyzes somehow the oxidation reaction. The same seems to be true of the tackifying action of certain alkalis (33). At times raw rubber, which has been made soft and sticky by such degradation procedures, loses most of its tackiness after a comparatively small fraction of it has been removed by some solvent, which does not dissolve the main stock. Figures 2a and 2b show the difference between the effect of homogeneous and heterogeneous degradation. It can be seen in Figure 2b that non-homogeneous degradation may cause a mixture of long and short chains, which exhibits stickiness as long as the short chains are present in the sample. As soon as they are removed, however, the tackiness decreases to its former value.

In Figure 2a we have the same number of end groups after the degradation as in 2b, and the stock will be tacky in both cases. However if both samples undergo treatment with a solvent or diluent, the material 2b will lose its short chains, and the result in this case will be the same number of chain ends as before degradation took place; hence there will be no increased tackiness. The material 2a, however, has no easily soluble short components and therefore will be unaffected by a solvent in respect to tackiness.

Tackiness can also be produced without any degradation process by the incorporation of a tackifying agent which usually is a resinous compound of relatively short chain length. This agent is capable of penetrating and opening up the structure of the rubbery material and assumes the role which the freely movable chain-ends or chain-segments play in a sample with intrinsic stickiness.

In the case of synthetic rubbers, particularly of polybutadiene derivatives, one is usually dealing with materials which are highly cross-linked. To increase their workability

and tackiness both degradation and tackifying agents have been used. Fabrizieff and Bujko (11), Hagen (17), and Reiner (28), have, among others, investigated the degradation of such systems by oxygen. Much more severe conditions have to be used than for natural rubber. However, lately, by the use of certain accelerators and catalysts this oxidative degradation is becoming more and more practicable.

The use of tackifying binding materials is also quite common with synthetic rubbers, but usually they are not sufficiently effective to produce the required tackiness and have to be incorporated under rather severe conditions such as heat and pressure. It seems that this incorporation is also very frequently accompanied by some oxidative degradation. The most usual softeners of this type are materials such as wood rosin, burgundy pitch, cumar resin, etc., all characterized by a medium degree of polymerization and by the presence of reactive groups, which increase the specific molar cohesion. Anderson (2), Klebsattel (21), Proske (27), and Sebrell and Dinsmore (29) have investigated and described such substances and their use.

It has also been observed that the tackiness of butadiene rubbers, which usually is on the low side, can be increased to a certain degree by copolymerization, using other hydrocarbons such as isobutylene or styrene. Such copolymerization products show slightly better tackiness than the pure compounds of corresponding degree of polymerization. It may be that the addition of a vinyl-type hydrocarbon interferes somehow with the cross-linking reaction during polymerization and leads to a less cross-bonded material. But it must be emphasized that even this step does not improve the products to the extent that they can be compared with natural rubber. Voge (32) describes some recent developments in the field of butadiene copolymerization in which cyclohexane, certain unsaturated ketones, and some hydrazine derivatives are reported to be used advantageously to increase the stickiness of the products.

Bibliography

(1) T. Alfrey, *Rubber Chem. Tech.*, 14, 525 (1941).
(2) J. G. Anderson, *Trans. Inst. Rubber Ind.*, 14, 266 (1939).
(3) J. Behre, *Kautschuk*, 11, 43 (1935).
(4) E. C. Bingham, "Fluidity and Plasticity." McGraw-Hill Book Co., Inc., New York, 1922.
(5) J. T. Blake, and P. L. Bruce, "Proceedings of the Rubber Technology Conference, 1938." Paper No. 21, p. 736. W. Heffer & Sons, Ltd., Cambridge, England, 1938.
(6) S. Boström, *Kautschuk*, 16, 123 (1940).
(7) F. H. Cotton, *India-Rubber J.*, Nov. 25, 1939, p. 611.
(8) H. Erbring, *Kolloid-Beihefte*, 44, 171 (1936); *Kolloid-Z.*, 90, 257 (1940).
(9) W. Esch, *Gummi-Ztg.*, 52, 1300 (1938); *Kunststoffe*, 30, 223 (1940).
(10) H. Eyring, and R. H. Ewell, *J. Chem. Phys.*, 4, 283 (1936); 5, 726 (1937).
(11) H. Eyring, and R. E. Powell, *J. Am. Chem. Soc.*, 62, 3113 (1940).
(12) B. Fabrizieff and G. Bujko, *Kautschuk*, 12, 240 (1936).
(13) P. J. Flory, *J. Am. Chem. Soc.*, 58, 1877 (1936); 61, 3334 (1939); 62, 1057, 2255, 2261 (1940).
(14) C. S. Fuller, W. O. Baker and W. Hess, *Ibid.*, 63, 3316 (1941).
(15) T. L. Garner, *Trans. Inst. Rubber Ind.*, 4, 413 (1929).
(16) R. W. Griffith and M. Jones, *Ibid*, 4, 235 (1928).
(17) H. Hagen, *Kautschuk*, 14, 203 (1938); 15, 88 (1939).
(18) R. Houwink, "Elasticity, Plasticity, and Structure of Matter." The Macmillan Co., New York, 1937.
(19) M. L. Huggins, *J. Chem. Phys.*, 8, 181 (1940).
(20) S. Kambara, *Rubber Chem. Tech.*, 10, 312 (1937).
(21) C. A. Klebsattel, India Rubber World, Sept., 1940, p. 37.
(22) E. O. Kraemer, *Ind. Eng. Chem.*, 30, 1200 (1938).
(23) O. Kratky and H. Mark, *Papier Fabr.*, 36, 345 (1938).
(24) H. Mark, *J. Phys. Chem.*, 44, 764 (1940).
(25) W. A. Maslowski and T. N. Popova, *Chem. Zentr.*, II, 4727 (1938).
(26) L. B. Morgan and W. J. S. Naunton, *Kautschuk*, 15, 130 (1939).
(27) G. Proske, *Gummi-Ztg.*, 53, 393 (1939).
(28) S. Reiner, *Kautschuk*, 16, 138 (1940).
(29) L. Sebrell and R. Dinsmore, India Rubber World, Apr. 1, 1941, p. 45.
(30) H. Staudinger, *Zellstoff u. Papier*, 18, 459 (1938); *Papier Fabr.*, 36, 489 (1938).
(31) P. Stocklin, *Kautschuk*, 15, 117 (1939).
(32) L. Voge, India Rubber World, Sept. 1, 1940, p. 42. Oct. 1, p. 41. July 1, 1941, p. 39.
(33) O. Vries, "Proceedings of the Rubber Technology Conference, 1938." Paper No. 4, p. 17.
(34) F. L. Yerzley, *Ind. Eng. Chem.*, 31, 950 (1939).

Limitation Order No. L-61[1]

To Regulate Production and Distribution of Rubber Tire Retreading and Recapping Equipment

WHEREAS the shortage of crude rubber for military requirements and essential civilian uses has created an abnormal demand for Retreading and Recapping Equipment for rubber tires; and

Whereas the supply of existing Retreading and Recapping Equipment, if supplemented by careful selection of locations for small quantities of additional equipment, is adequate to satisfy the demand for Retreading and Recapping of Rubber Tires; and

Whereas the production for delivery of Retreading and Recapping Equipment, if unregulated, will duplicate existing facilities and thus utilize quantities of scarce and critical materials as to which defense requirements have created a shortage for defense, private account, and export, and it is necessary, in the public interest and to promote defense of the United States, to take the measures hereinafter set forth, and to regulate the production and delivery of Retreading and Recapping Equipment.

Now, therefore, it is hereby ordered that:

1114.1 Limitation Order L-61.

(a) *Definitions.* For the purpose of this order:

(1) "Person" means any individual, partnership, association, business trust, corporation, governmental corporation, or agency, or any organized group of persons, whether incorporated or not.

(2) "Retreading and Recapping Equipment" means any mechanical device which applies uncured rubber compound (in the form of camelback, or otherwise) to rubber tires for the purpose of renewing the tire tread. The term includes parts such as holders, tables, matrices, curing rings and bands, pressure plates, molds, steam chambers, and kettle-curing devices, but does not include such shop equipment as section molds, tire repair and spot equipment, tube vulcanizers, tire spreaders, buffers, spacer rings, boilers, curing rims, regroovers, mandrels, breaker screws, jacks or small shop tools such as knives, rollers, and stitchers.

(b) *Restrictions on Manufacture and Distribution.* No manufacturer of Retreading and Recapping Equipment, or parts therefor, shall produce any such equipment, or parts therefor, except to fill orders rated on a Preference Rating Certificate PD-1A issued by the Director of Industry Operations; and no manufacturer or distributor of Retreading and Recapping Equipment, or parts therefor, shall sell, lease, lend, rent, deliver, or otherwise transfer, any new Retreading or Recapping Equipment, or parts therefor, except to fill orders rated on a Preference Rating Certificate PD-1A issued by the Director of Industry Operations.

(c) *Criteria for Issuing Preference Rating Certificates.* In issuing ratings on Preference Rating Certificates, the Director of Industry Operations will consider the following factors, to the extent feasible, among others;

(1) The number and capacity of Retreading and Recapping Equipment facilities at present available in the particular locality.

(2) The anticipated need for Retreading and Recapping Equipment in the particular locality.

(3) The amount of camelback expected to be made available in the particular locality.

(4) The existence of orders placed prior to January 28, 1942, and the amount of work already done on these orders.

(d) *Non-applicability to Repair or Maintenance of Existing*

(Continued on page 42)

[1]Title 32—National Defense, Chapter IX—War Production Board. Subchapter B—Division of Industry Operations. Part 1114—Rubber Working Machinery.

Distributers' Tire Stocks in the United States, January 1, 1942

E. G. Holt[1]

THE results of the twentieth quarterly survey of retail stocks of automobile tires and inner tubes, as of January 1, 1942, are shown below in comparison with summary data for other quarterly surveys. The bases and methods described in earlier reports have been used in calculating stocks held by the following groups of distributers: 1. Individual dealers, including large and small retailers. 2. Distributers through oil-company chains of filling stations. 3. Manufacturer-owned-and-operated stores, mail-order houses, and other important retail chains.

Distributers' Stocks Increase

A slight increase in distributers' stocks of tires is customary during the fourth quarter of the year and occurred during the final quarter of 1941, although a decline was considered likely. Total stocks of casings increased from 6,478,000 last October 1 to 6,602,000 on January 1, 1942. Increases were general except for stocks in company stores operated by tire manufacturers; subtracting these stocks, the total for remaining distributers increased from 5,679,000 last October to 6,012,000 January 1, according to the summary estimates.

Sales of casings to consumers during the fourth quarter of 1941 are calculated at 6,865,000, compared with 7,663,000 during the final quarter of 1940, a decline of 10%. Consumer buying in the second and third quarters of 1941 set a high record of 26,327,000, an increase of 24% over the same period of 1940, and the 1941 total of 39,417,000 was 12% above 1940.

DETAILS OF CASING STOCKS DURING RECENT QUARTERS
(Thousands of Casings)

Year and Month	Dealers	Oil Companies	Other	Total
1942				
January	3,182	1,440	1,980	6,602
1941				
October 1	2,933	1,403	2,142	6,478
July 1	3,372	1,927	2,385	7,684
April 1	3,367	1,858	2,461	7,686
January 1	3,248	1,772	2,290	7,310
1940				
October 1	3,139	1,790	2,341	7,270
July 1	3,281	1,796	2,982	8,059
April 1	3,312	1,755	2,482	7,549
January 1	2,996	2,000	2,014	7,010
1939				
October 1	3,122	1,487	2,250	6,859
July 1	2,900	1,646	2,356	6,902
April 1	3,018	1,725	2,074	6,817
January 1	2,735	1,838	1,220	6,493
Annual average:				
1938	2,844	1,976	2,031	6,851
1937	3,399	1,874	2,298	7,571
1936	3,500	1,650	2,000	7,150

Stocks of Inner Tubes about Normal

Stocks of inner tubes in hands of distributers January 1, 1942, were almost identical with their holdings two years earlier and slightly higher than on January 1, 1941. An increase over October, 1941, stocks were reported by all classes of distributers except the company-owned stores.

ESTIMATED DISTRIBUTERS' STOCKS OF INNER TUBES
Thousands of Inner Tubes

Year and Month	Dealers	Oil Companies	Other	Total
1942				
January 1	3,374	1,205	1,933	6,512
1941				
October 1	2,972	1,158	2,014	6,144
July 1	3,517	1,582	1,908	7,007
April 1	3,948	1,561	1,810	7,319
January 1	3,290	1,541	1,579	6,410
1940				
October 1	3,029	1,501	1,754	6,284
July 1	3,486	1,446	1,799	6,731
April 1	3,551	1,487	1,821	6,859
January 1	3,310	1,671	1,532	6,513
1939				
October 1	3,220	1,406	1,793	6,419
July 1	3,206	1,393	1,829	6,428
April 1	3,460	1,626	1,588	6,674
January 1	3,445	1,733	1,599	6,777
Average, 1938	3,565	1,908	1,739	7,212

Dealers' Reported Stocks

Stocks reported January 1 by 1,171 dealers operating 1,460 outlets are compared below with stocks reported by the same dealers on October 1, when their outlets numbered 1,576. Increased stocks were reported by the larger dealers, and there was an overall increase despite lower holdings by dealers in the group reporting under 200 casings each.

REPORTED STOCKS OF CASINGS AND TUBES

Casings reported:	Dealers	Stores	October 1, 1941 Casings	Tubes
Under 200	825	900	66,896	82,289
200 to 500	209	271	57,236	61,261
Over 500	137	405	165,837	155,197
Total	1,171	1,576	289,969	298,747
Index	....	....	83.8	....
Casings reported:			January 1, 1942	
Under 200	825	893	61,037	80,517
200 to 500	209	273	64,147	68,024
Over 500	137	294	189,457	186,114
Total	1,171	1,460	314,641	334,655
Other January 1	360	515	112,856	117,796
Total January 1	1,531	1,975	427,497	452,451
Index	....	....	90.9	96.4

Oil-Company Distributer Stocks

Comparative figures were received from 30 firms in the oil-company distributers' group; some reports covered stocks in central warehouses only; while others also covered stocks in about 16,800 retail outlets. Stocks of casings increased slightly, and inner tubes more sharply, compared with October 1.

OIL COMPANY REPORTED STOCKS

	Oct. 1, 1941	Jan. 1, 1942
Number of firms	30	30
Casings	777,053	797,594
Tubes	651,792	720,881
Index Numbers:		
Casings	85.0	87.25
Tubes	.....	79.1

(Continued on page 42)

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Compression Testing Rubber Compounds Used in Submarine Cables

F. L. Downs[1]

NON-LEADED rubber-insulated submarine cable has always been one of the most interesting and difficult types of wire to manufacture. Two distinct problems are encountered with regard to the rubber compounds used; one problem concerns the outer jacket, or belt, which may be used to cover the entire cable; the other concerns the insulating compound for each of the single conductors.

When laid in deep water, the cable is subjected to enormous pressures. The result is a tendency of each single wire to cut outward through its individual insulation, thus destroying or seriously impairing the operation of the cable through the entrance of moisture.

The compound used for the outer jacket is required to withstand unusual abuse. While it encounters enormous pressure in deep water, portions of the same cable are often in shallow, rocky locations where it is exposed to the danger of being snagged by anchors, cut by keels of boats, and in winter subjected to the grinding action of ice and sharp rocks.

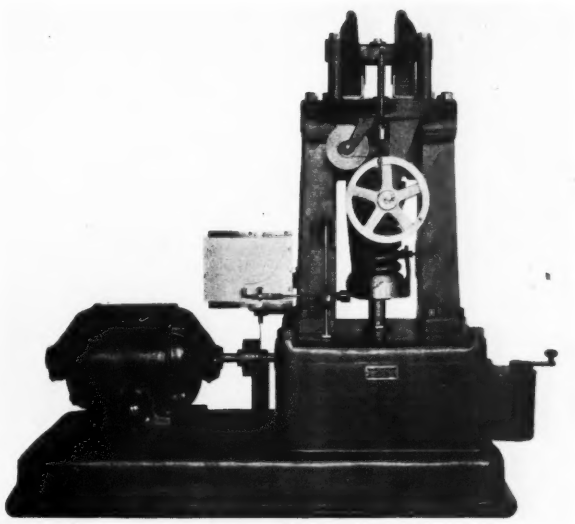
Because of these gruelling conditions, and because of the difficulty of locating any faults that might occur in submarine cable in service, specifications for the rubber compounds have continually been made more rigid. One of the recent developments has been to establish a standard method of test and appropriate limits for resistance of rubber compounds to compression cutting. By this standard the manufacturer has been enabled to perform control tests upon the product as manufactured as well as to develop this essential property to an optimal extent in stocks which have already proved suitable from the standpoint of the many other necessary physical and electrical characteristics. Also, the purchaser can assure himself that the wire he receives possesses this property, vital to long service.

Prior to the formulation of this standard, the subject of resistance to compression cutting had been treated by rule-of-thumb methods, using a sash weight drop or other simple test. This satisfactorily showed relative resistance to cutting, but the new specifications outlined a standardized test designed to determine the actual load required to shear the cable insulation or jacket.

The pressure cutting of the single wires outward through their insulation could be simulated readily in a test.

The specimen of rubber is forced against a cutting tool by a moving steel anvil, one inch in length. The driving load is applied to the anvil through a calibrated spring which is compressed by a motor-driven screw. Compression and the actual shearing load are mechanically recorded on a chart. This machine is described in detail by W. L. Holt in Bureau of Standards Research Paper RP-674 entitled "Compression Cutting Test for Rubber."

It was essential to secure a testing apparatus which would be conclusive in results and which would conform to standards set up by the customer. For this purpose a Scott compression tester of the same type already used by a number of laboratories was selected. This machine, made by Henry L. Scott Co., Providence, R. I., was installed in the A.S.&W. Development & Research Laboratory in a constant temperature chamber. Compounds in the development stage are proved here and are checked, from order to order, by routine control men to insure adherence to specification requirements.



Henry L. Scott Co.

Fig. 1. Close-up View of Compression-Cutting Tester Used for Tests Described in This Article

The Scott compression machine gives its result in the form of a "picturized" chart which shows on the vertical scale the amount of compression of the specimen and on the horizontal the load applied. Because this equipment is standardized and has been adopted generally, customers' inspection tests upon our cable coincide virtually 100% with our charts. There is a minimum of variation between results obtained on any two machines, due to the fact that the tests are made mechanically, free from the element of human variation.

One further advantage in the physical testing of rubber by compression cutting is the ease in preparation of samples. The troublesome buffing and gaging of test specimens are eliminated, and a dozen compression tests can be made in the time necessary to make one tensile and elongation test.

As an example of a modern set of specifications for submarine cable jacket and insulation compounds, the following are listed:

BELT OR JACKET COMPOUND

TENSILE

Original—3,600 pounds per square inch.

Aged in oxygen bomb 48 hours at 300 pounds at 70° C.—must retain 75% of original tensile strength.

Aged in Geer oven seven days at 70° C.—must retain 75% of original tensile strength.

ELONGATION

Unaged—500%.

Aged in oxygen bomb 48 hours at 300 pounds at 70° C.—must retain 75% of original elongation.

[1] Chemist, American Steel & Wire Co., Worcester, Mass.

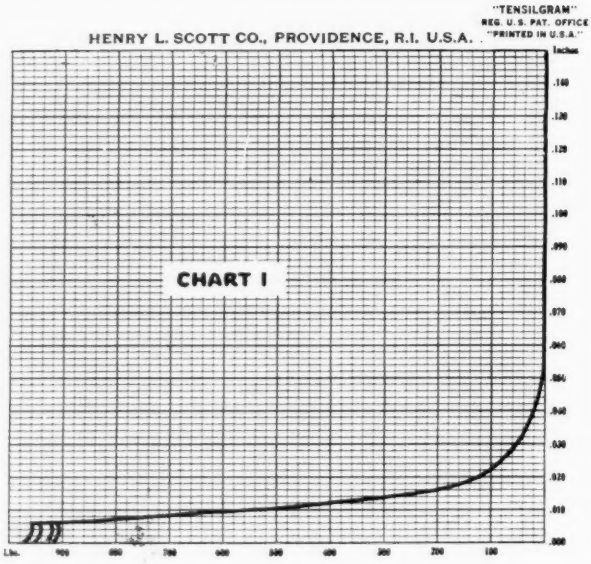


Fig. 2

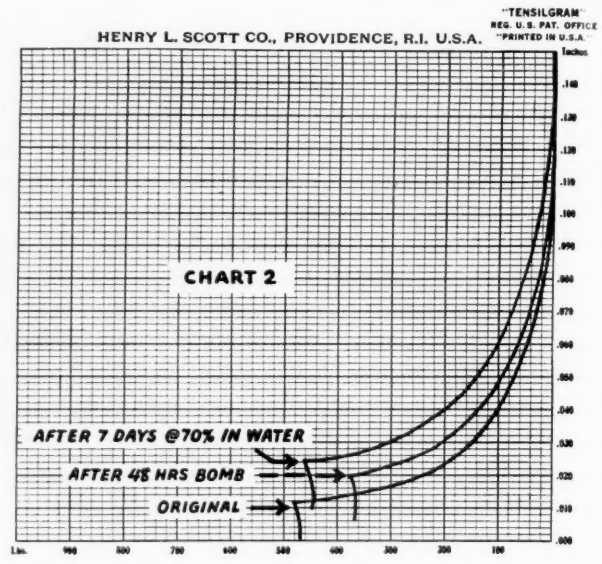


Fig. 3

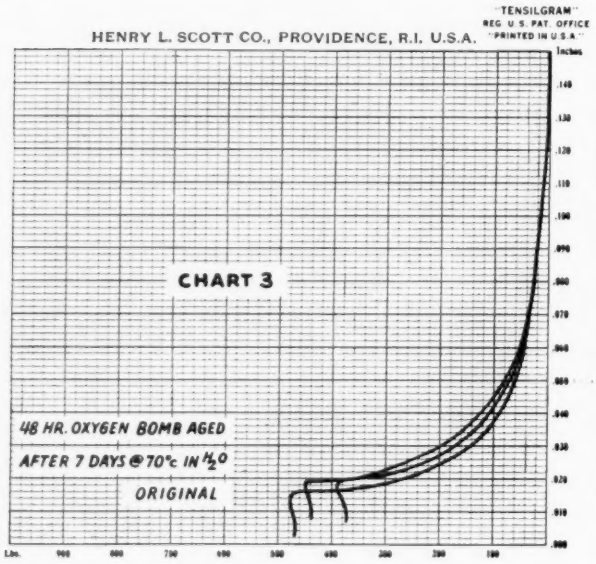


Fig. 4

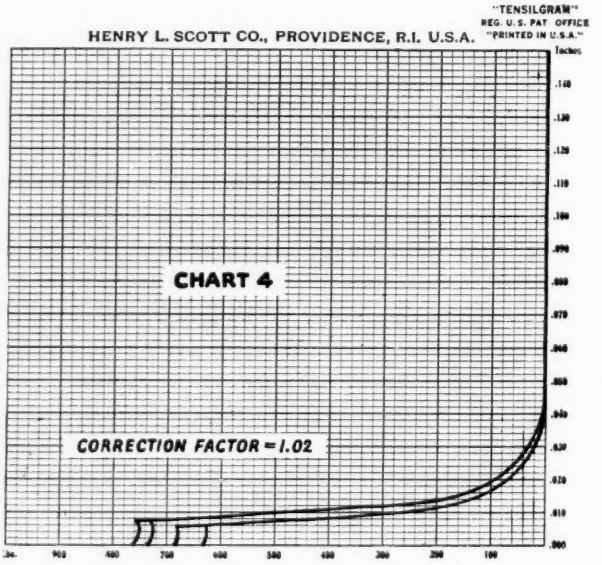


Fig. 5

Aged in Geer oven seven days at 70° C.—must retain 75% of original elongation.

MODULUS

Unaged—at 300% elongation, modulus 1300 pounds per square inch.

WATER ABSORPTION

Immersed at 70° C. for seven days—not over 25 milligrams per square inch of exposed surface.

Combined with the above must be the following resistance to compression cutting.

COMPRESSION CUTTING

Unaged—must withstand 1,000 pounds' pressure without cutting through.

Aged 48 hours in oxygen bomb under 300 pounds pressure at 70° C.—must retain 80% of original value.

Aged seven days in distilled H_2O at 70° C.—must retain 80% of original value.

TEAR TEST

Minimum load at which tear occurs, not less than 40 pounds per inch thickness.

INSULATING COMPOUND

TENSILE

Original—2000 pounds per square inch.

Aged in oxygen bomb 48 hours at 300 pounds at 70° C.—must retain 75% of original tensile strength.

Aged in Geer oven seven days at 70° C.—must retain 75% of original tensile strength.

ELONGATION

Unaged—500%.

Aged in oxygen bomb 48 hours at 300 pounds at 70° C.—must retain 75% of original elongation.

Aged in Geer oven seven days at 70° C.—must retain 75% of original elongation.

MODULUS

Unaged—at 200% elongation, modulus 300 pounds per square inch.

WATER ABSORPTION

Immersed at 70° C. for seven days—not over 20 milligrams per square inch of exposed surface.

COMPRESSION

Unaged—must withstand 650 pounds' pressure without cutting through.

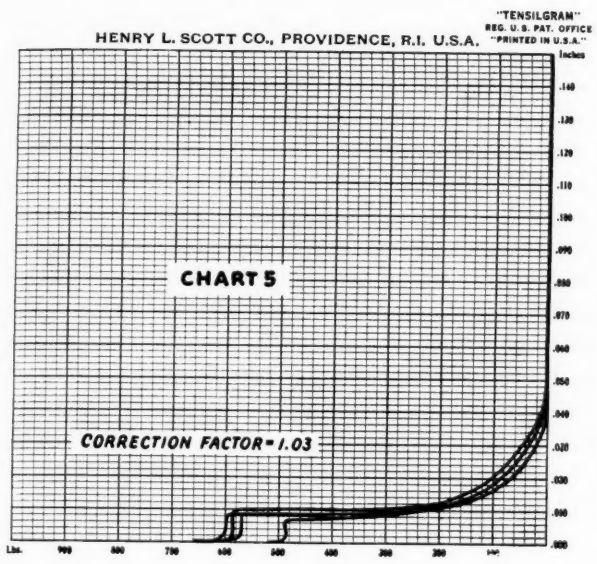


Fig. 6

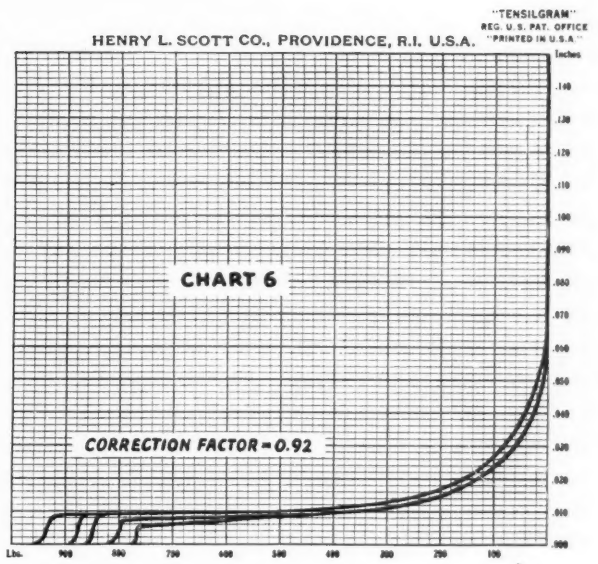


Fig. 7

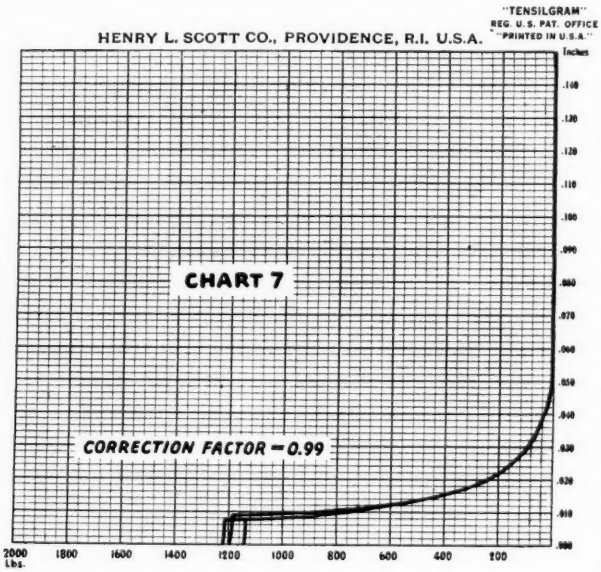


Fig. 8

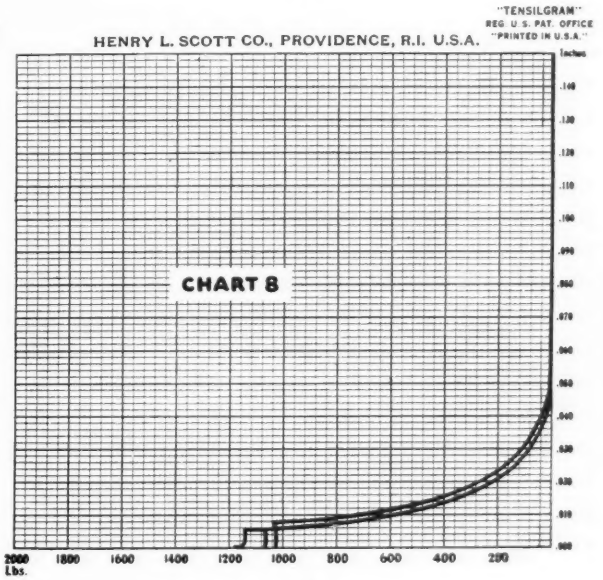


Fig. 9

Aged 48 hours in oxygen bomb under 300 pounds' pressure at 70° C.—must retain 80% of original value.
Aged seven days in distilled H_2O at 70° C.—must retain 80% of original value.

Our experience with leadless rubber-insulated submarine cables goes back 40 years or more. These cables, for high voltage operation, with their heavy rubber walls were not subjected to the same stresses as present-day low-capacity signal cable with its thin insulation walls and specialized high rubber content insulation. In both cases, however, compression testing has enabled us to control factory curing to provide the optimum degree of serviceability.

Many hundreds of tests were performed in the process of evolving the final compounds which successfully met and exceeded the requirements. As the work went on, a graphic history of progress was accumulated in the form of the charts made on the compression tester.

A number of these charts have been selected for illustration here.

Chart 1 (Figure 2) shows the test on one of the early specimens of jacket compound. It showed good resistance to compression cutting, 933, as against a requirement of 1,000, but failed to meet some of the other specifications. (Note the close uniformity of the four samples that were tested.)

Chart 2 is a test on one of the earlier insulating compounds. This met all the other requirements, but fell short of the 650-pound compression cutting requirement by about 25%.

Chart 3 is a check on Chart 2. Ordinarily all tests are made in duplicate, and it can be noted from comparison of these two charts how faithfully the machine reproduces results, owing to its mechanical operation and freedom from the human element.

Chart 4 shows a test on an insulating compound which

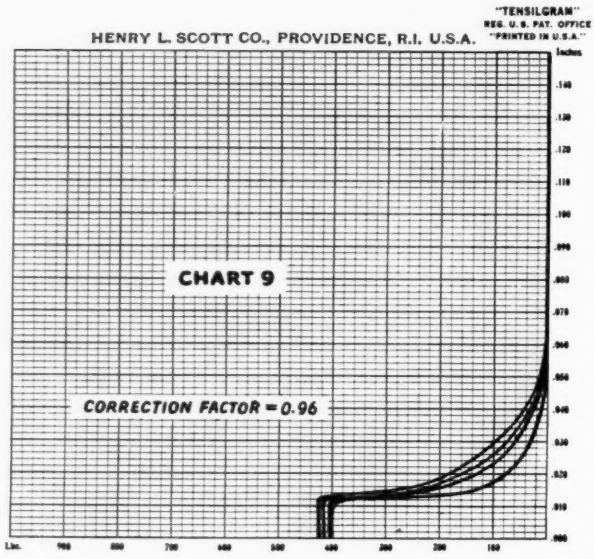


Fig. 10

successfully embodied all requirements in the unaged state, having an average compression cutting resistance of 710 pounds, as against the requirement of 650.

Chart 5 shows the same compound after 48 hours in the oxygen bomb. With an average resistance to cutting of 581 pounds in this condition, it has lost but 17.8%, as against an allowable 20% loss for this aging.

Chart 6 shows the above compound after water absorption tests, seven days in water at 70° C. Resistance to compression cutting has actually increased from 710 to 786 average, as against an allowable loss of 20%.

Chart 7 is a test on a jacket compound which in all ways met the specifications, having an average compression cutting resistance of 1,161 pounds, as against the 1,000 pounds required.

Chart 8 shows the same type of jacket after three years in service, retaining a compression cutting resistance of 1,087 pounds.

Chart 9 shows a test upon a commercial grade of insulation picked up in the field after three years of service which will illustrate a type of compound used before adoption of the newer specifications. The 395-pound average is considerably below the modern requirements of 650 pounds less an allowable 20% loss for aging.

These few charts, selected from many hundreds of tests, illustrate graphically why we value so highly the picturized method of testing on a machine that assures consistent uniformity both between tests made on the same machine and also between tests made on our machine and that used by the customer. The permanent record of each lot of cable shipped is of great convenience and value in discussing the product with the user, as well as enabling us to control our production to utmost advantage.

In comparison with other commonly used tests, such as tensile strength or resistance to abrasion, the compression cutting test is less time-consuming and fully as significant, particularly in the case of such a product as is discussed here. No appreciable time is required for preparation of specimens and, as indicated above, the variation between individual tests is slight. It is gratifying to observe that even an unskilled operator can reproduce on the Scott compression tester the results obtained by the most skilled technician.

Order No. L-61

(*Continued from page 37*)

Equipment. The prohibitions of paragraph (b) hereof shall not be construed to restrict the sale, lease, loan, renting, delivery or other transfer of parts to be used to repair or maintain existing equipment, or equipment delivered in accordance with the terms of this Order.

(e) *Applicability of Priorities Regulation No. 1.* This Order and all transactions affected thereby are subject to the provisions of Priorities Regulation No. 1 (Part 944), as amended from time to time, except to the extent that any provision hereof may be inconsistent therewith, in which case the provisions of this Order shall govern.

(f) *Communications to War Production Board.* All Communications concerning this Order shall, unless otherwise directed, be addressed to:

"War Production Board
Washington, D. C. Ref: L-61"

(g) *Appeals.* Any person affected by this Order who considers that compliance therewith would work an exceptional and unreasonable hardship upon him may appeal to the Director of Industry Operations, Washington, D. C., Ref: L-61, setting forth the pertinent facts and the reason he considers he is entitled to relief. The Director of Industry Operations may thereupon take such action as he deems appropriate.

(h) *Violations.* Any person who wilfully violates any provision of this Order, or who by any act or omission falsifies records to be kept or information to be furnished pursuant to this Order, may be prohibited from receiving further deliveries of any Material subject to allocation, and such further action may be taken as is deemed appropriate, including a recommendation for prosecution under Section 35(a) of the Criminal Code (18 U.S.C. 80).

(i) *Reports.* Manufacturers of Retreading and Recapping Equipment shall file such monthly and other reports with the Division of Industry Operations as shall from time to time be requested by said Division.

(j) *Effective Date.* This Order shall take effect immediately and shall continue in effect until revoked by the Director of Industry Operations.

Issued this 11th day of March, 1942

J. S. Knowlson
Director of Industry Operations

Other Mass Distributers' Stocks

(*Continued from page 38*)

Reports were received from six tire manufacturers, operating 2,206 outlets (2,257 last October) showing company store stocks of 589,911 casings and 642,517 tubes. Casings stocks were reduced 26% and tube stocks 14%, below October 1, 1941. These stocks are also included in manufacturers' stocks reported by The Rubber Manufacturers Association, Inc.

Additional reports were received from nine other mass distributers, operating 2,191 retail outlets (and/or doing a mail-order business). Their stocks of tires and tubes increased 50,000 and 26,000 respectively, during the quarter ended January 1, 1942.

Mass Distributers' Reported Stocks

	Oct. 1, 1941	Jan. 1, 1942
Number of firms	15	15
Stores	4,443	4,397
Casings	2,130,134	1,970,926
Tubes	2,007,528	1,928,330

The total January 1 stocks of this group, estimated in summary tables, include a small allowance for a firm which reported last October, but not in the current survey.

The support of The Rubber Manufacturers' Association, Inc., the assistance of the National Association of Independent Tire Dealers, and the prompt cooperation of dealers, oil-company distributers, manufacturers, and other mass distributers in submitting data used in this report are gratefully acknowledged.

German Patents Relating to Vinyl Polymers—V

M. Hoseh

THE chlorination of vinyl chloride is the subject of patent (22).[1] A polyvinyl chloride, obtained by any of the well-known methods is dissolved or suspended in a suitable liquid and then subjected to the action of Cl. When the chlorination has reached the desired stage, a fact which determines the product's properties, the product is separated from the solvent either by distillation or precipitation followed by filtration, and the polymer depolymerized. This latter is accomplished by heating the polymer to the proper temperature. The product is a white powder suitable for many technical uses, e.g., photographic and other films, sheets as glass substitutes, foils for packaging, insulation, etc., impregnating material for fabrics, and thermoplastics.

The use of styrol polymers is handicapped by the fact that articles such as films, plates, etc., made from it develop cracks. Their prevention is the subject of patent (23), whereby cracking and other deterioration of styrol polymers is inhibited by adding during or before the polymerization 5 to 10% of a diphenyl chloride preferably pentachlorodiphenyl.

Further improvements in the procedure described in (2)[2] are described in patent (24). It covers polymerization of an ethylene-α-β-dicarboxylic acid and a polymerizable compound having an olefinic double bond, e.g., maleic acid and styrol, is conducted in the presence of a suitable, non-interfering resin, fat, oil, or wax, particularly colophonium. Thus the resin is heated to 100-120° C., and to the molten mass is added slowly the styrol, or similar substance, and the maleic acid, whereupon the whole is heated to 130-140° C. The so-obtained products are superior, and their technical uses manifold.

A method for the preparation of new valuable synthetic resins is described in patent (25). According to this method mixtures of mono- or polyolefinobenzenes or mono- or polyolefinonaphthalenes, e.g., styrol divinylbenzene, vinylnaphthalene, etc., and unsaturated ketones having an olefinic linkage conjugated to the keto group, e.g., vinylmethyl ketone, methylene-ethylmethyl ketone, benzalacetone, etc., are polymerized together in any of the well-known ways. The reaction is promoted by oxygen yielding substances. The resulting products have all the good qualities of resins from unsaturated hydrocarbons and of resins from unsaturated ketones. The properties of the final product are controlled by regulating the respective amounts of the reactants.

The suitability of isobutylene polymerization products as plasticizers is the subject of patent (26). Isobutylene polymers are advantageously used as plasticizers for rubber chloride, as well as polymers of styrol, butadiene, vinyl chloride, etc. They reduce remarkably the brittleness and rigidity of these substances and noticeably increase their resistance to water, acid, alkali, oxygen, chlorine, SO_2, and other chemicals. The above substances, when mixed with isobutylene polymers, can be used as lacquers, insulators, coating material, adhesives, etc.

Patent (27) indicates a method for the preparation of synthetic substances from polyvinyl chloride and condensation products of polyhydric alcohols with polybasic acids. Glycerol, phthalic acid, and glycol esters of dibasic, aliphatic acid are condensed. The condensation product is mixed with a vinyl chloride polymer, α-cellulose, and TiO_2, and the whole masticated in a rubber kneading machine at an elevated temperature. The product can be then heat pressed. Besides the mentioned compounds other similar ones can be used for the condensation reaction. The properties of the products are determined by the components and their relative quantities.

New, hard, elastic thermoplastics are obtained as described in (28). Mixed polymers of vinyl esters and acrylic acid esters, preferably taken in equal amounts, are dissolved in an organic solvent or made into an aqueous dispersion and saponified. For this process it is advisable to start with equimolecular quantities of vinyl acetate and methylacrylic ester. The saponification can be done with acid and an alkali or with the latter alone. The product is suitable to be hot-pressed, made into films, thread, etc.

A method for producing plastic masses from paraffin compounds and a polysulphide are described in (29). A functional paraffin, e.g., CH_2O, hexamethylenetetramine, or propane, butane, pentane dihalides, etc., is dispersed in water and treated with a soluble polysulphide in the presence of $Mg(OH)_2$ or an insoluble alkaline earth hydroxide. To avoid a too-violent reaction it is preferable to add the paraffin slowly to the hot polysulphide. The product is then washed and coagulated with an alkali. Before the coagulation a protective colloid, preferably of a protein character, albumin, gelatin, casein, etc., is added. The product freed of all soluble salts is then masticated in a rubber kneading machine. At this time can be added the usual fillers.

Patent (30) gives a method for the preparation of polyvinyl esters. Monomeric esters of vinyl alcohol, of which the acid component is an alkylated oxyacid, e.g., vinylmethoxyacetate, vinylethoxyacetate, vinylmethoxybutyrate, etc., are polymerized in the usual way. To avoid overpolymerization the reaction is conducted in the presence of a suitable solvent. The monomers are produced by the action of acetylene on the respective carboxylic acid. This reaction is conducted with the aid of catalysts in the usual way. These esters are quite important as plasticizers for acetyl cellulose.

This patent (31) deals with incorporating fibrous materials into thermoplastic substances. To an aqueous suspension of a fibrous material, e.g., cellulose, asbestos, comminuted leather, etc., is added an aqueous dispersion of a polymerized styrol, preferably a polymerized α-metastyrol. The mixture is intimately mixed, e.g., in a hollander, and the polymer either precipitated on the fiber or the mixture simply evaporated. The product is then finished on rolls or calender into plates or sheets. The process can be carried out entirely on paper mill equipment. If desired, the styrol can be mixed with dispersions or solutions of new or regenerated rubber, asphalt, pitch, natural or synthetic resins, etc. The finished product has many superior properties and for some purposes surpasses a similar product made with latex.

A method for increasing the viscosity of polyvinyl alcohols is given in (32). According to this method, the viscosity of polyvinyl alcohols or their derivatives is appreciably increased even by small quantities of boron compounds such as H_3BO_3, its anhydride as well as its organic and inorganic salts. Besides the change in viscos-

[1] For details on patents see end of this article.
[2] See INDIA RUBBER WORLD, Mar. 1, 1942, p. 571.

ity the boron compounds induce no other chemical changes and affect none of the other desirable properties.

Heavy metal salts of polymerized carboxylic acids are described in (33). Polymerized carboxylic acids containing several hydroxyls, or the alkali salts of such acids are caused to react with water soluble heavy metal salts. The precipitate is filtered and washed free of electrolytes. These water insoluble salts are soluble in weakly alkaline solutions of, e.g., alkali hydroxides, alkali carbonates, and nitrogenous bases such as ammonia, triethanolamine, etc. Suitable polycarboxylic acids are the polymers of acrylic acid, mixed polymers of maleic acid anhydride and styrol, fumaric acid and styrol, vinylbutyl ether and maleic anhydride, etc. The uses of these heavy metal salts are many; thus the Hg and Bi containing salts, are used as medicinals; those containing Ag, Pb, or Cl are used for photographic purposes; Pb salts are valuable in the X-ray technique; while Fe, Ag, and Cu salts are used electrotechnically.

Valuable saponification products from mixtures of polyvinyl esters with fatty oils are described in patent (34). According to it, mixtures of polyvinyl esters and fatty oils, e.g., vinyl acetate and stand oil, are saponified in any of a variety of methods between room and boiling temperature. Substances which promote the reaction can be added. Among such substances are polyvinyl alcohol, gelatin, dextrose, starches, and in some instances, soaps, Turkey red oil, and others. Depending on the parent material, auxiliary substances used, and temperature employed, the product has different qualities. The products are valuable dispersants and wetting agents; and are used for sizing and finishing textiles; as thickeners for paint; in printing inks and India ink; and in combating plant parasites.

A way to improve the mechanical properties of polyvinyl chloride products is given in patent (35). The method is simple, and the mechanical properties of foils and sheets made from polyvinyl chlorides are remarkably improved. The method consists in steeping the solidified sheet or foil for two to ten hours in an organic solvent which does not attack the polyvinyl chloride, but which extracts from it any residues of solvent or softener which were used in its preparation. Among the compounds having this beneficial influence on polyvinyl chlorides are MeOH, BuOH, cyclohexanone, benzene, etc.

A polymerization method whereby insoluble products are obtained is described in patent (36). The degree of polymerization is determined by the chosen procedure. Thus if the reaction is influenced by heat, the degree of polymerization is 50 to 200, and the product is readily soluble. On the contrary, if the reaction is allowed to proceed slowly and at ordinary temperatures, the solubility is greatly diminished, and the product only swells. By the addition of divinyl benzene to styrol a polymer is obtained which is completely insoluble, and even the swelling can be inhibited if the right amount of the divinyl benzene is added.

This patent (37) gives a new method for the preparation of polyvinyl esters readily soluble in organic solvents. Hitherto for the saponification of polyvinyl esters were used only high-molecular acids, viz., colophonium, pine rosin, copal, synthetic resins, stearic acid, etc. By the new method the saponification succeeds also with low-molecular acids, e.g., formic, propionic, butyric, etc., acids provided they are used in considerable excess, and if necessary with a catalyst.

Patent (38) describes a method for the preparation of technically valuable salts of a carboxylic acid polymer and a heterocyclic base. These salts are obtained by the action of the polycarboxylic acid on the free base or via metathesis of the respective salts. If the resulting salt is insoluble in the reaction medium, it is simply filtered and washed; otherwise it is precipitated and subsequently washed free of electrolytes. The products are of a colloidal nature and can be used as such or they can be formed into foils, filaments, plates, etc. They can be molded by spraying or pressing or they can be spun. They are valuable for medicinal uses, both external and internal, and for pest control. They are serviceable for paints and lacquers as well as filter aids, and many other uses.

Thallous salts of carboxylic acid polymers are prepared and utilized as described in (39). The salts are prepared by the action of the free polycarboxylic acid, preferably polyacrylic acid, on the dissolved Tl salts, or by metathesis using an alkali salt of the polymer. Other polymers too can be advantageously used, e.g., mixed polymers of styrol and maleic anhydride, fumaric acid and styrol, vinylbutyl ether and maleic acid anhydride, etc. These Tl salts are water soluble without the aid of alkalis. This property makes them very valuable for uses where the presence of alkalinity is injurious, e.g., matrices for Zn, Al, or Cu. These salts are also used for making protective coatings on substances susceptible to alkalinity. They also can be made into plates, foils, films, and similar goods.

Synthetic materials having the properties of rubber are prepared according to (40) by treating alkyldithiosulphuric acids or their salts with NH_4, alkali, or alkaline earth polysulphide. Suitable acids for this purpose are ethylenedithiosulphuric acid, diethyl-β,β'-dithiosulphuric acid ether, propane-2-hydroxy-1,3-dithiosulphuric acid, 1,4-dithio-2-butene sulphuric acid. The mixture of the two components can be emulsified with albumin, soaps, isopropylnaphthalenesulfonic acid, and then coagulated with salts or weak acids. The emulsion can also be mixed with latex wherefrom is obtained a homogeneous plastic body. The plasticity of the product is determined by the nature of the thiosulphuric acid and the amount of S in the polysulphide. The product can be worked like rubber except no S needs to be added when vulcanized.

Patent References

(22) No. 596,911. Applied May 24, 1932. Granted Apr. 26, 1934. G. Schönburg, assigned to I. G. Farbenindustrie A.G., Frankfurt, a.M., Germany.
(23) No. 598,279. Appl. Sept. 9, 1932. Gr. May 24, 1934. R. Müller to Allgemeine Elektricitäts-Gesellschaft, Berlin, Germany.
(24) No. 598,732. Appl. Oct. 30, 1932. Gr. May 31, 1934. A. Voss and L. Berlin, to I. G. Farbenindustrie.
(25) No. 599,058. Appl. Feb. 10, 1931. Gr. June 7, 1934. K. Meisenburg, W. Bock, and O. Bachle, to I. G. Farbenindustrie.
(26) No. 601,253. Appl. Nov. 30, 1932. Gr. July 19, 1934. M. Müller-Cunradi, W. Daniel, and M. Otto, to I. G. Farbenindustrie.
(27) No. 601,323. U. S. appl. July 21, 1931. Ger. appl. July 22, 1932. Gr. July 26, 1934. Allgemeine Elektricitäts.
(28) No. 601,324. Appl. Dec. 11, 1932. Gr. July 26, 1934. H. Fikentscher, to I. G. Farbenindustrie.
(29) No. 601,920. U. S. appl. Aug. 8, 1930. Ger. appl. June 23, 1931. Gr. Aug. 9, 1934. J. C. Patrick, Trenton, N. J., U. S. A.
(30) No. 604,776. Appl. June 25, 1933. Gr. Oct. 11, 1934. I. G. Farbenindustrie.
(31) No. 605,903. U. S. Appl. Nov. 3, 1930. Ger. appl. Oct. 16, 1931. Gr. Nov. 1, 1934. Naugatuck Chemical Co., Naugatuck, Conn., U. S. A.
(32) No. 606,440. Appl. Oct. 13, 1931. Gr. Nov. 15, 1934. A. Voss and W. Starck, to I. G. Farbenindustrie.
(33) No. 606,677. Appl. June 3, 1932. Gr. Nov. 15, 1934. M. Hagedorn, to I. G. Farbenindustrie.
(34) No. 608,158. Appl. June 29, 1932. Gr. Dec. 27, 1934. W. O. Herrmann and W. Haehnel, to Chemische Forschungsgesellschaft m.b.H., Munich, Germany.
(35) No. 609,264. Appl. Dec. 9, 1931. Gr. Jan. 24, 1935. I. G. Farbenindustrie.
(36) No. 610,478. Appl. Nov. 2, 1933. Gr. Feb. 14, 1935. H. Staudinger, Freiburg i.Br., Germany.
(37) No. 610,898. Appl. Dec. 28, 1930. Gr. Feb. 28, 1935. G. Kränzlein, A. Voss and W. Starck, to I. G. Farbenindustrie.
(38) No. 611,759. Appl. Nov. 6, 1932. Gr. Mar. 21, 1935. M. Hagedorn, to I. G. Farbenindustrie.
(39) No. 612,023. Appl. June 3, 1932. Gr. Mar. 21, 1935. I. G. Farbenindustrie.
(40) No. 612,665. Appl. Nov. 9, 1933. Gr. Apr. 4, 1935. I. G. Farbenindustrie.

(To be continued)

Henderson on Rubber Supplies and Needs[1]

I WANT to thank the Committee for responding so promptly to my suggestion for an early public hearing on the gravity of the rubber supply. I believe this Committee can perform a great public service by bringing to the attention of the American people the situation which they face in the months to come.

I expect shortly to present the statistics of the over-all United Nations' supplies and requirements, but the item of greatest importance to the owners of 30 million automobiles in this country cannot be presented in this statistical table because to date we have been unable to allocate even a single pound of new crude rubber for new tires or recapping of those which are now on the cars. That means starkly and simply that the majority of these cars are likely to be laid up when their present tires are worn out and the ingenuity of their owners has been exhausted.

We will not only have to do without tires, but we will also be without a multitude of other rubber articles which have become essential parts of standards of life.

I am not trying to scare anyone unnecessarily. I am simply attempting to develop public understanding and recognition of the hard cold facts.

I should like to give you first the crude rubber outlook for the next three years as we found it to be a few weeks ago when it became apparent that further shipments from the Far East could not be expected. It must be kept in mind that 98% of our rubber supply comes normally from the areas which the Japs have already overrun or are threatening.

Table A indicates that at the current rate of use of rubber the United Nations would have had net stocks at the end of this year of only 278,000 tons and faced a complete exhaustion of stockpiles by the end of March of next year.

TABLE A. UNITED NATIONS CRUDE RUBBER OUTLOOK

	1942	1943	1944
Supply—New Supplies during Year			
Crude Rubber Shipments	434,000	135,000	98,000
Synthetic Rubber	25,000	165,000	362,000
U. S. Grown Guayule	.....	1,000	5,000
	459,000	301,000	465,000
Demand—United States Military Forces, Lend-Lease, South American Export	409,000	617,000	617,000
U. S. Civilian	200,000	165,000	165,000
Rest of Non-Axis World	265,000	265,000	265,000
	874,000 Deficit	1,047,000 Deficit	1,047,000 Deficit
Result—Supply Minus Demand	415,000	746,000	582,000 Deficit
Total Stocks at Beginning of Year	693,000	278,000	468,000
		Deficit	Deficit
Net Stocks End of Year for Next Year	278,000	468,000	1,050,000

It was necessary, therefore, to consider what relief might be obtained from an increase in the actual delivery of synthetic in the amount of 300,000 tons in 1943 and 600,000 tons in 1944. Table B presents this picture. It indicates that as far as the crude rubber picture is concerned we would still have exhausted our stockpile by May of 1943.

TABLE B. UNITED NATIONS CRUDE RUBBER OUTLOOK

	1942	1943	1944
Supply—New Supplies during Year			
Crude Rubber Shipments	434,000	135,000	98,000
Synthetic Rubber	25,000	300,000	600,000
U. S. Grown Guayule	.....	1,000	5,000
	459,000	436,000	703,000
Demand—United States Military Forces, Lend-Lease, South American Export	409,000	617,000	617,000
U. S. Civilian	200,000	165,000	165,000
Rest of Non-Axis World	265,000	265,000	265,000
	874,000 Deficit	1,047,000 Deficit	1,047,000 Deficit
Result—Supply Minus Demand	415,000	611,000	344,000 Deficit
Total Stocks at Beginning of Year	693,000	278,000	333,000
		Deficit	Deficit
Net Stocks End of Year for Next Year	278,000	333,000	677,000

The Requirements Committee of the War Production Board with this stark picture in mind therefore was compelled to cut down the allocations to all classes of users in the united nations picture by 25%, effective immediately. The effect of this drastic action is shown in Table C.

TABLE C. UNITED NATIONS CRUDE RUBBER OUTLOOK

	1942	1943	1944
Supply—New Supplies during Year			
Crude Rubber Shipments	434,000	135,000	98,000
Synthetic Rubber	25,000	300,000	600,000
U. S. Grown Guayule	.....	1,000	5,000
	459,000	436,000	703,000
Demand—United States Military Forces, Lend-Lease, South American Export	*306,750	*462,750	*462,750
U. S. Civilian	*150,000	*123,750	*123,750
Rest of Non-Axis World	*198,750	*198,750	*198,750
	*655,500 Deficit	*785,250 Deficit	*785,250 Deficit
Result—Supply Minus Demand	196,500	349,250	82,250
Total Stocks at Beginning of Year	693,000	496,500	147,250
Net Stocks End of Year for Next Year	496,500	147,250	65,000

*Showing effect of a 25% reduction in demand which will be met.

It will be obvious to the Committee that only in this way can the lack in production of synthetic be linked to our crude rubber stockpile in order to meet the requirements of the United Nations for the next three years.

Let me point out again that in none of these three tables does the allocation for United States civilian purposes as yet provide any rubber for any of the 30 million passenger cars which are now in operation here. I think the Committee will agree with me that the action taken to freeze all existing stocks of tires was well justified and that instead of the situation improving it has become increasingly grave.

Frankly, I believe it will almost require a miracle to secure the amount of synthetic rubber—300,000 tons in 1943 and 600,000 tons in 1944—shown in that table. If the miracle doesn't occur, if the synthetic rubber plants aren't completed on schedule, our situation will be immeasurably worse.

Now don't be misled by the apparent magnitude of the supply and demand figures in table C. Remember, first, that they cover not only the United States, but also all the other nations on "our side." Furthermore, we cannot become heartened by the fact that this table indicates a small balance of rubber of some kind still available at the end of 1944. That balance can be achieved only by the blanket reduction of 25% in both military and civilian consumption below their previously estimated essential requirements.

Now the table shows civilian consumption of 150,000 tons in 1942, and of 123,750 tons in 1943 and 1944. What do such totals mean in terms of our civilian economy?

In the first place, let me give you an idea of what has already been done by way of drastic curtailment of civilian uses of rubber, exclusive of the great amount which formerly went for new automobile tires and tubes. In the base period which was April 1, 1940, to March 31, 1941, this averaged around 17,440 tons a month. The allocation of rubber for this category of civilian needs totals about 5,500 tons, which means that we have already accomplished a curtailment of 11,940 tons a month, which was taken out of civilian goods other than tires. I had hoped that this was as deep a cut in civilian life as we could go. In fact, I had hoped that we could find some available crude for class B trucks and for the most essential of passenger automobiles. However the Committee will see that with our allotment of 10,000 tons per month beginning in April we face another deficit, because our class A trucks now require 6,500 tons and the March non-tire uses are 5,500. In other words, before we can begin thinking of anything for any passenger-car automobile in this country and anything in the way of crude rubber for class B trucks, we first must find ways to cut 2,000 more tons. In order to keep in operation any substantial number of essential cars now classified in our A and B tire lists, another 500 tons a month is required, and in order to maintain on a drastically reduced operation basis class B trucks another 150 tons a month is needed just for camelback. To sum up, as we face the situation today, the existing civilian uses must be cut 2,650 tons a month at least.

Thus far, I haven't mentioned reclaim rubber. To many people this seems to offer salvation. But the most important

(*Continued on page 48*)

[1] Statement by Leon Henderson, Administrator, Office of Price Administration, and Director, Division of Civilian Supply, War Production Board, before the Senate Committee Investigating National Defense Activities on March 5, 1942.

Agreement Establishing Maximum Prices for Waterproof Rubber Footwear

THE stabilization of waterproof rubber footwear prices is important to the success of the war effort. Such products are important articles of mass consumption, purchased in large quantities by low- and middle-income groups. The Price Administrator and the undersigned manufacturer desire to cooperate in preventing unwarranted increases in the cost of this commodity to the consumer. The undersigned manufacturer desires that this objective be accomplished by a voluntary agreement rather than by a maximum price regulation or order, and the Price Administrator has expressed his willingness to enter into such an agreement.

In view of the foregoing and other considerations, it is agreed between the Price Administrator and the undersigned manufacturer, pursuant to Section 5[1] of the Emergency Price Control Act of 1942, as follows:

1. The undersigned manufacturer will not sell, offer to sell, deliver, or transfer, any waterproof rubber footwear, produced after February 11, 1942, at a price per pair in excess of the following:

Type	Price per Pair
Boots	
Men's Short	$2.75
Women's Short	2.30
Men's Stormking	4.05
Men's Hip	4.65
Pacs	
Men's 12" Toplace Pac	3.20
Men's Lumber Overs, Half Heel (rubber part only)	2.00
Arctics	
Men's 5-Buckle Rubber Midweight Bal	3.15
Men's 4-Buckle Rubber Midweight Bal	2.75
Men's 4-Buckle Cloth Farmweight Blucher	2.75
Men's 4-Buckle-Height Lightweight Bal-Rubber	
a. Buckle	2.30
b. Strap	2.25
c. Slide	2.65
Boy's 3-Buckle Lightweight Bal-Rubber	2.00
Youth's 3-Buckle Lightweight Bal-Rubber	1.85
Women's 4-Buckle-Height Lightweight Bal-Rubber	
a. Buckle	2.05
b. Strap	1.80
Men's 4-Buckle Lightweight Bal-Cloth	2.65
Gaiters	
Women's 2-Snap-Height Rubber	
a. Snap	1.15
b. Slide	1.50
Misses' 2-Snap Rubber	1.12
Child's 2-Snap Rubber	1.09
Rubbers	
Men's Work Rubbers, Storms and/or Semi-Storms	1.25
Boy's Work Rubbers, Storms and/or Semi-Storms	1.20
Men's Storms and/or S. A. Overs (full lined)	1.10
Boy's Storms and Overs (full lined)	1.00
Youth's Storms and Overs (full lined)	.90
Women's Overs (full lined)	.88
Growing Girl's Storms (full lined)	.88
Misses' Storms (full lined)	.80
Child's Storms (full lined)	.73
Women's footholds	.58
Severe Occupational	
Men's Black Short Boot	3.15
Men's Black Short Steel Toe Boot	3.65
Men's Black Short, Firefighter Boot ($5.25 Felt)	4.65
Men's Black Stormking Firefighter Boot (6.75 Felt)	6.15
Men's Black Hip Boot	5.05
Men's Black Hip Steel Toe Boot	5.55
Men's Black Body Boot	12.00
Men's Black 15" Lace Mine Pac	4.15
Men's Black 15" Lace Mine Pac, Steel Toe	4.65
Men's Black Work Shoe	3.00
Men's Black Work Shoe, Steel Toe	3.50
Men's Black, Two-Buckle Perfections	2.80

2. The maximum prices set forth in paragraph 1 are to apply only when the article or articles in question are the best quality line produced under the restrictions on rubber consumption promulgated by the War Production Board.

3. Fourteen days after the signing of this agreement the undersigned manufacturer agrees to submit to the Office of Price Administration all specifications and physical data relating to this quality of waterproof rubber footwear manufactured by him. If, upon the receipt of these specifications and physical data, the Price Administrator does not deem the article or articles in question to be best quality merchandise, produced under the restrictions on rubber consumption promulgated by the War Production Board, he shall, after consultation with the manufacturer, designate a maximum price or prices. The undersigned manufacturer agrees not to sell, offer for sale, deliver, or transfer the article or articles in question at a price or prices in excess of those so designated by the Administrator. If the undersigned manufacturer reduces the rubber content of any article by more than 10% from the specifications submitted or makes any other substantial change in the product, he shall consult with the Office of Price Administration before selling, offering to sell, delivering, or transferring such products. The provisions of this paragraph shall not be applicable to waterproof rubber footwear produced prior to February 11, 1942.

4. It is further agreed that the undersigned manufacturer will not sell, offer to sell, deliver, or transfer, any waterproof rubber footwear produced prior to February 11, 1942, at net prices in excess of those charged on December 3, 1941. Ten days after the signing of this agreement, the undersigned manufacturer shall file with the Office of Price Administration all price lists in effect on December 3, 1941, which shall be signed by the parties hereto and become part of this agreement.

5. Ten days after the signing of this agreement the undersigned manufacturer agrees to file with the Office of Price Administration all trade, cash, quantity, advance buying, and other discount schedules, freight allowances and rebates, postage allowances and rebates, and/or any other deductions from the list price generally in effect on December 3, 1941. He further agrees to maintain in effect all such deductions from the list price. A list of all such deductions shall be signed by the parties hereto and become part of this agreement.

6. The undersigned manufacturer further agrees not to add to the prices specified herein any service charge or charges, except that he may add a service charge of five ($0.05) cents per pair on any order amounting to six (6) pairs or less. However, the provisions of this paragraph shall not be used as a means of evading the maximum prices established by this agreement.

7. The undersigned manufacturer further agrees to file with the Office of Price Administration any price list or lists of products covered by this agreement that are submitted to any of his customers or prospective customers.

8. The undersigned manufacturer agrees to file with the Office of Price Administration, at the request of the Administrator, all available specifications, and physical data relating to waterproof rubber footwear manufactured by him.

9. Waterproof rubber footwear may be sold, offered for sale, delivered, or transferred at a price less than that specified herein.

10. This agreement shall be effective immediately upon signature and will remain in full force and effect for a period of ninety (90) days therefrom. In the event that the undersigned manufacturer wishes to terminate this agreement before that time, he may do so by giving notice in writing to the Administrator thirty (30) days in advance. Such notice will not be effective until it is received at the Office of the Administrator in Washington, D. C.

11. Unless the undersigned manufacturer notifies the Administrator in writing of his desire to terminate this agreement, at least fifteen (15) days before the date of termination thereof, he shall be deemed to have agreed to renew each provision of this agreement, including this provision, for a period of ninety (90) days from the termination date thereof. Such notice will not be effective until it has been received at the Office of the Administrator in Washington, D. C.

12. Any provision of this agreement may be automatically

(*Continued on page 96*)

[1] Section 5. In carrying out the provisions of this Act, the Administrator is authorized to confer with producers, processors, manufacturers, retailers, wholesalers, and other groups having to do with commodities, and with representatives and associations thereof, to cooperate with any agency or person, and to enter into voluntary arrangements or agreements with any such persons, groups, or associations relating to the fixing of maximum prices, the issuance of other regulations or orders, or to other purposes of this Act, but no such arrangement or agreement shall modify any regulation, order, or price schedule previously issued which is effective in accordance with the provisions of Section 2 or Section 206. The Attorney General shall be promptly furnished with a copy of each such arrangement or agreement.

Guayule Rubber Production Project Launched

THE Forest Service and the Bureau of Plant Industry —following instructions from Secretary of Agriculture Claude D. Wickard—are proceeding with a program for government production of guayule rubber in the Western Hemisphere and for investigating the possibilities of other rubber-bearing shrubs. Other bureaus of the United States Department of Agriculture, Secretary Wickard stated, will be called upon for such additional technical information and assistance as is necessary.

This action followed immediately passage of the so-called guayule rubber production act (S. 2282) by Congress and its signature by the President.

The assignment of the action program for guayule production was given to the Forest Service, Secretary Wickard said, because of the wide experience of that bureau in the operation of nurseries for the production of forest trees and some shrubs and grasses and in making extensive field plantations throughout a large part of the United States. The Prairie States Forestry Project of the Forest Service, which has established 16,000 miles of shelterbelts on 22,000 farms in the Prairie States since 1935, has also involved many of the operating problems which will be met in the guayule undertaking.

The Bureau of Plant Industry, the Secretary added, is charged with responsibility for making the essential technical investigations relating to the production of crops of guayule and the rubber-producing possibilities of other shrubs. It has studied guayule and its rubber producing possibilities for many years and is prepared to continue research on the plant as well as on the possible use of other rubber-bearing plants in the Western Hemisphere, as provided in the act (S. 2282).

"It is recognized that the project authorized by the legislation just enacted, is not in itself an immediate solution of the nation's rubber supply problem," Secretary Wickard explained. "The law limits field plantings of guayule to 75,000 acres, which is about all that can be accomplished by the Spring of 1943 with seed which is available at present, but once the project is under way, there will be opportunity for expansion if needed."

Guayule, according to officials called upon by the Secretary, is a slow-growing shrub native to limestone slopes of north central Mexico and the Big Bend area of Texas. Commercial shipments of wild guayule rubber have been made from Mexico for many years. Production of such wild rubber, however, is not expected to exceed 10,000 tons annually, provided the areas where it grows are so managed that only mature plants are taken and enough shrubs are left to insure natural restocking.

The nucleus of the government's undertaking already exists in the properties and processes developed by the Intercontinental Rubber Co. in its production of guayule for many years from the wild shrub in Mexico and experimentation with cultivation of guayule in California and at other points in the Southwest. The act authorizes the Department of Agriculture to acquire this company's seed supplies, processes, and facilities for "not to exceed $2,000,000." An agreement has been reached for purchase of these properties at a cost of $1,721,235.

Domestication of the guayule was first attempted in Mexico in 1907; experiments subsequently were extended to this country, and the work centered at the Salinas, Calif., headquarters, where there are now 577 acres of growing shrubs, four years old or older, and a factory for the extraction of the rubber. Long years of experimentation coupled with the development of specialized machinery for seed collecting, growing, harvesting, and manufacturing the guayule have characterized the development.

Uncertain market prices for plantation Para rubber discouraged any large extension of guayule acreage in this country in the past, it is said. The wild shrub of Mexico yields from 8 to 12% of rubber, dry weight, but has a resin content of about 20% so that it has brought only about 80% of the normal price for plantation rubber from the Malay States and the East Indies.

As part of the effort to grow guayule under cultivation more than a thousand different strains have been studied, and among 100 still under observation, selections have been made which after four years in the field yield 20% of rubber based on dry weight of the shrubs, and with a resin content in the extracted rubber of 16%. Deresination of the rubber is not practiced at present because the resin is not disadvantageous when the product is used for special purposes, the needs for which are limited. Increased use would require deresination—such deresinated rubber as tested by American tire manufacturers being reported equal in quality to high-grade plantation rubber and requiring no changes in manufacturing plant or equipment.

Indications are that good crop land will prove most suitable to guayule production. Rainfall of only eight to twenty inches a year seems sufficient for normal yields provided little or none of it occurs during the summer season when rains discourage rubber accumulation in the plant. Except for certain seedling diseases and root rot in some areas, the plant appears to be rather resistant to insect and disease enemies.

The guayule plants are cultivated like corn, four times the first year, three times the second and third years, then twice the fourth year. Harvesting is confined to the so-called dormant period when the rubber content of the plant is greatest. While best returns are obtained when the shrub is four to seven years old, plants can be taken earlier.

The entire shrub is harvested, practically all of the rubber being found in the cells in the cortex underlying the bark of the roots, stem, and large branches. The process of separating the rubber from the woody tissues is carried on by a continuous disintegration and flotation method requiring a minimum of hand labor.

After being chopped up, the pieces are crushed and run through revolving tube mills where water and flint pebbles macerate or disintegrate the fiber—the entire mass then going into settling tanks where the agglomerated rubber rises to the surface in the form of fine spongy particles called "worms." The "worms" are next skimmed off together with a small amount of corky material, which is later water-logged under pressure so that it settles to the bottom, permitting removal of the raw rubber. This raw product is then placed in trays and dried under vacuum at temperatures of 270° F. for three or four hours before being pressed into hundred-pound slabs for shipment.

The Forest Service announced that it has selected one of its regional foresters, Evan W. Kelley, of Missoula, Mont., as field director, and Paul Roberts, director of the Prairie States Forestry Project, as associate director of the new guayule program. Operations will begin promptly under their direction with emergency funds made avail-

able by President Roosevelt, pending the initial appropriation by Congress for the work.

Present plans, according to Major Kelley, call for the sowing of 700 acres of nurseries this year, of which the net area in seed beds will be about 500 acres. The field planting, according to present estimates, will amount to about 1,100 acres. The original estimate was 2,000 acres, but the amount of usable seedlings is considerably less than was originally planned on.

The following is a copy of Senate bill 2282 as it appears in the "Congressional Record" of February 28, 1942.

Be it enacted, etc., That the Secretary of Agriculture (hereinafter called the "Secretary") is authorized—

(1) To acquire by purchase, license, or other agreement, the right to operate under processes or patents relating to the growing and harvesting of guayule or the extraction of rubber therefrom, and such properties, processes, records, and data as are necessary to such operation, including but not limited to any such rights owned or controlled by the Intercontinental Rubber Co., or any of its subsidiaries, and all equipment, materials, structures, factories, real property, seed, seedlings, growing shrub, and other facilities, patents and processes of the Intercontinental Rubber Co., or any of its subsidiaries, located in California, and for such rights, properties, and facilities of the Intercontinental Rubber Co. or any of its subsidiaries, the Secretary is authorized to pay not to exceed $2,000,000;

(2) To plant, or contract for the planting of, not in excess of 75,000 acres of guayule in areas in the Western Hemisphere where the best growth and yields may be expected in order to maintain a nucleus planting of guayule to serve as a domestic source of crude rubber as well as of planting material for use in further expanding guayule planting to meet emergency needs of the United States for crude rubber; to establish and maintain nurseries to provide seedlings for field plants; and to purchase necessary equipment, facilities, and land for nurseries.

(3) To acquire by lease, or other agreement, for not exceeding 10 years, rights to land for the purpose of making plantings of guayule; to make surveys, directly or through appropriate Government agencies, of areas in the Western Hemisphere where guayule might be grown; and to establish and maintain records indicating areas to which guayule cultivation could be extended for emergency production;

(4) To construct or operate, or to contract for the operation of, factories for the extraction of rubber from guayule, and from Chrysothamnus, commonly known as rabbit brush; and to purchase, operate, and maintain equipment for the harvesting, storing, transporting, and complete processing of guayule, and Chrysothamnus, commonly known as rabbit brush, and to purchase land as sites for processing plants;

(5) To conduct studies, in which he may cooperate with any other public or private agency, designed to increase the yield of guayule by breeding or by selection, and to improve planting methods; to make surveys of areas suitable for cultivating guayule, to make experimental plantings; and to conduct agronomic tests;

(6) To conduct tests, in which he may cooperate with any other public or private agency, to determine the qualities of rubber obtained from guayule and to determine the most favorable methods of compounding and using guayule in rubber manufacturing processes;

(7) To improve methods of processing guayule shrubs, and rubber and to obtain and hold patents on such new processes;

(8) To sell guayule or rubber processed from guayule and to use funds so obtained in replanting and maintaining an area of 75,000 acres of guayule inside the Western Hemisphere; and

(9) To exercise with respect to rubber-bearing plants other than guayule the same powers as are granted in the foregoing provisions of this section with respect to guayule.

SEC. 2. (a) The Secretary is authorized to appoint such employes, including citizens of countries in the Western Hemisphere, as may be necessary for carrying out the provisions of this act. Such appointments may be made without regard to the provisions of the civil-service laws and the compensation of the persons so appointed may be fixed without regard to the provisions of the Classification Act of 1923, as amended. All appointments so made by the Secretary shall be made only the basis of merit and efficiency.

(b) The Secretary may delegate any of the powers and duties conferred on him by this act to any agency or bureau of the Department of Agriculture.

(c) The Secretary, with the consent of any board, commission, independent establishment, corporation, or executive department of the Government, including any field service thereof, may avail himself of the use of information, services, facilities, officers and employes thereof, in carrying out the provisions of this act.

(d) The Secretary may allot to bureaus and offices of the Department of Agriculture, or may transfer to such other agencies of the State and Federal Governments as may be requested by him to assist in carrying out this act, any funds made available to him under this act.

SEC. 3. There are authorized to be appropriated such amounts as may be necessary to carry out the provisions of this act. Any amounts so appropriated, and any funds received by the Secretary under this act, shall remain permanently available for the purposes of this act without regard to the provisions of any other laws relating to the availability and disposition of appropriated funds and the disposition of funds collected by officers or agencies of the United States.

Henderson

(*Continued from page* 45)

fact about reclaim is that few products can be made from it alone. In almost every case some crude rubber must be mixed in.

At the present time we have capacity to produce about 350,000 tons of reclaim rubber a year. I hope to see this capacity expanded in the months ahead. But so far as civilian uses are concerned, I do not expect that there will be much more than 170,000 tons available. The balance of our production will be required for military purposes or for export.

Ordinarily we require about 40,000,000 passenger-car tires for replacement each year plus camelback for recapping about 5,000,000 others. We will be able to meet, through recapping, only about one-seventh of the combined passenger-car tire replacement and recapping demand. This means that only those passenger-car users on the Class A or Class B eligibility lists will be able to secure recapped tires. As a practical matter it means that we will be doing well if we are able to keep running some of the cars of defense workers, the largest group in the Class B list. In addition, there will be a few new passenger car tires sold from inventory to Class A users. That, gentlemen, is the best we can hope for as far as passenger car operators are concerned. Thus you can see there is little hope that the ordinary passenger-car operator can get either a new or recapped tire in 1942, 1943 or 1944.

This means that when the tires on the average passenger car begin to go bad, that car will have to be taken out of operation. We hope at best as we see it now to maintain in operation over the next three years a total of 7,500,000 passenger cars, including those belonging to a large number of defense workers.

But this can be done only if speeds are kept below 40 miles an hour, if tires are given the best of care, if they are inspected frequently to insure recapping when the proper time arrives, and if all unnecessary driving is eliminated. It can be done only if we expand our reclaiming capacity and our recapping facilities, if we make a vigorous effort to collect all of the scrap rubber possible, and if we rigidly control the use of reclaim rubber for civilian purposes. We know that in 1943 and 1944 recapping of passenger-car tires alone will not be sufficient. We will have to supplement recapping with some new tires in those years and those new tires will have to be made almost entirely from reclaimed rubber.

If we don't use extreme care in driving speeds, tire inspection, and tire maintenance, if we don't campaign vigorously for scrap rubber, and if we don't control the use of reclaim rigidly, we may be faced with the necessity in 1943 and 1944 of severe gasoline rationing to preserve tires or, as some have suggested, confiscation of tires on private cars. We must insure a certain minimum of passenger transportation.

In closing I want to warn the public against holding out any hope of getting substantial amounts of rubber in the near future from Brazil or from the guayule plant. Brazil never has produced more than a small fraction of our needs since the use of automobiles became widespread in this country. We can expect a little expansion of production there, but the problems of labor, transportation, and initial processing at the source will be extremely difficult to overcome. Likewise, several years would be required to develop the cultivation of guayule on a volume basis. We cannot expect substantial relief from either of these sources soon.

Amendments to Supplementary Order No. M-15-b-1 to Restrict the Use and Sale of Rubber[1]

No. 1

Section 940.5 (Supplementary Order No. M-15-b-1) is hereby amended as follows:

1. By changing subparagraph (b) (7) thereof to read as follows:
   (7) Tires, tire casings, tire tubes, capping stock and camelback and compounds therefor. List 7
2. By substituting the attached lists designated Lists 6 and 7 for Lists 6 and 7, respectively, now attached to such Order.
3. By changing subdivision (a) of List 9 attached thereto to read as follows:
   (a) Compounds used in the manufacture of tires and tire casings to fill War Orders shall be prepared in accordance with the specifications set forth in subdivision (a) of List 7 attached to this Order as such List may be revised from time to time.
4. By inserting the following new paragraph at the end of subdivision (b) of List 9 attached thereto:
   With the types of formulas specified above, and with mold and gages selected, a manufacturer can calculate the maximum amounts of rubber and whole-tire reclaimed rubber which may be used in the manufacture of a tire or tire casing of any specified type and size. Within the maximum amounts of rubber and whole tire reclaimed rubber thus calculated, a manufacturer may, in his discretion, shift the amounts between friction and tread, but may not use in the manufacture of any tire or tire casing more rubber or more whole-tire reclaimed rubber than would be used in the manufacture of such tire or tire casing if the above specifications for tread and friction were followed, after allowing for tolerances permitted.
5. By changing subdivision (g) of List 9 attached thereto to read as follows:
   (a) Maximum material volumes of tire tubes for passenger automobile tires and truck tires shall be subject to the limitations for those types of tubes as set forth in subdivision (d) of List 7 attached to this Order, as such List may be revised from time to time.
6. By inserting the figure "0" opposite the words "Twist to left—maximum degrees per foot" in each of the columns headed "1½ inch" and "2½ inch" under the heading "Single Jacket" in paragraph (8) of List 10 attached thereto.
7. By inserting the following new subparagraph immediately after subparagraph (b) (10) thereof:
   (11) Truck tire flaps List 11
8. By attaching thereto the attached additional list designated List 11.

This Order and the specifications set forth in the lists attached hereto become effective on March 23, 1942.

Issued this 25th day of March, 1942.

J. S. KNOWLSON,
Director of Industry Operations.

LIST 6

(Revised effective March 23, 1942)

Specifications for the manufacture of water-proof boots, pacs, arctics, gaiters and overshoes.

(1) All such products shall be manufactured in a black color only.
(2) No rubber shall be used for label plasters.
(3) Production shall be confined to the following types, and the average amount of Rubber per pair used in the manufacture of each type shall not be greater than the indicated maximum weight.

	Average Weight of Rubber (in Pounds) Maximum
Boots	
Men's Short	1.25
Women's Short	.75
Men's Storm King	2.00
Men's Hip	2.30
Pacs	
Men's 12" Toplace Pac	1.05
Men's Lumber Overs, Half Heel	.80
Arctics	
Men's 5-Buckle Rubber Midweight Bal	1.15
Men's 4-Buckle Rubber Midweight Bal	1.05
Men's 4-Buckle Cloth Farmweight Blucher	.90
Men's 4-Buckle-Height Lightweight Bal-Rubber	.75
Boy's 3-Buckle Lightweight Bal-Rubber	.62
Youth's 3-Buckle Lightweight Bal-Rubber	.53
Women's 4-Buckle Height Lightweight Bal-Rubber	.54
Men's 4-Buckle Lightweight Cloth	.65
Gaiters	
Women's 2-Snap or Slide Rubber	.30
Misses' 2-Snap Rubber	.30
Child's 2-Snap Rubber	.27
Rubbers	
Men's Storms and/or Semi-Storms	.60
Boy's Storms	.50
Men's Storms and/or S.A. Overs (full lined)	.35
Boy's Storms and/or Overs (full lined)	.30
Youth's Storms and/or Overs (full lined)	.25
Women's Overs (full lined)	.25
Growing Girls' Storms (full lined)	.27
Misses' Storm (full lined)	.20
Child's Storms (full lined)	.20
Women's Over-Toe-Rubbers	.13

LIST 7

(Revised effective March 23, 1942)

Specifications for the manufacture of tires, tire casings, tire tubes and capping stock and compounds therefor.

(a) Compounds

Description of Product Type	Grade	Maximum % by Volume Rubber	Maximum % by Volume Whole-Tire Reclaimed Rubber
(1) Tread, capping stock and camelback compounds	A	73	0
	B	59.5	17.5
	C	47.9	31.4
	D	40.4	41.3
	E	26.0	57.0
	F	0	89.3
(2) Passenger friction compounds	A	93.8	0
	B	78.0	15.2
	C	59.8	34.2
	D	43.2	50.3
	E	18.8	73.1
	F	0	90.2
	FF	6.4	85.0
(3) Truck friction compounds	A	88.5	0
	B	77.0	9.3
	C+	68.9	24.7
	C	59.8	34.2

Variations from the above specifications are permitted as follows:

Rubber	Plus 0	Minus 2
Whole-tire reclaimed rubber	Plus 2	Minus (not limited)

In the event that no friction compound or tread compound in use by any Person on January 26, 1942, contains as large a percentage of rubber as specified above, such Person shall not use or adopt the grade A friction compound or the grade A tread compound without the prior approval of the Director of Industry Operations.

(b) Tire casings and solid tires

The friction and the tread, respectively, of each of the classes of tire casings and solid tires listed below shall be made from one of the grades of compounds listed in subdivision (a) of this list, the appropriate grade of compound to be used for each such respective friction or tread being that herein below specified therefor opposite the description or designation of such class (provided that in no event shall any such tire herein required to be made of both grade F friction compound and grade F tread compound contain more than one pound Rubber):

Description of Product	Compounds to Be Used: Passenger Friction	Tread
(1) Passenger automobile tires, standard grade	F	F
(2) Passenger automobile tires, premium grade, size 7.50 and larger	B	B
(3) Passenger automobile tires, premium grade, size 7.00 and smaller	C	B
(4) Road grader or road builder tires for drop center rims	E	C
(5) Agricultural equipment tires, garden tractor	F	F
(6) Agricultural equipment tires, implements and tractors, size 6.50 and larger	E	C
(7) Agricultural equipment tires, implements and tractors, size 6.00 and smaller	F	F
(8) Agricultural equipment tires, fronts, 6.00 and smaller	F	C
(9) Motorcycle tires	C	A
(10) Mileage tires, taxi	C	C
(11) Industrial pneumatic tires	D	C
(12) Industrial solid tires	E	A F
(13) House trailer tires		

[1] Title 32—National Defense, Chapter IX—War Production Board, Subchapter B—Division of Industry Operations. Part 940—Rubber and Products and Materials of Which Number Is a Component.

Truck Friction

	Truck Friction	Tread
(1) Truck tires, 17-24-inch rims, size 6.50 and smaller	C+	C
(2) Truck tires, 17-24-inch rims, size 7.00, 8-ply and less	C+	C
(3) Truck tires, 17-24-inch rims, size 7.50, 8-ply and less	B	B
(4) Truck tires, 17-24-inch rims, size 7.00 to 7.50, inclusive, more than 8-ply	A	C
(5) Truck tires, for 15-inch flat base rims, 7.50 and larger, more than 8-ply	A	B
(6) Truck tires, 17-24-inch rims, size 8.25 and larger	A	B
(7) Truck tires, 13-16-inch rims, 8-ply and less	C	C
(8) Truck tires, 13-16-inch rims, more than 8-ply, except 7.50 section and larger for 15-inch flat base rims	A	C
(9) Off highway, heavy-service tires, 8-ply or less	B	C
Road grader or road builder tires for flat base rims		
Rock tires		
Earth movers		
Mud and snow tires larger than 14 inches		
(10) Off highway, heavy-service tires, 10-ply or more	A	A
Road grader or road builder tires for flat base rims		
Rock tires		
Earth movers		
Mud and snow tires larger than 14 inches		
(11) Mileage tires, city buses	B	C
(12) Mileage tires, intercity buses	A	A

With the types of formulas specified above, and with mold and gages selected, a manufacturer can calculate the maximum amounts of Rubber and whole-tire reclaimed rubber which may be used in the manufacture of a tire or tire casing of any specified type and size. Within the maximum of Rubber and whole-tire reclaimed rubber thus calculated, a manufacturer may, in his discretion, shift the amounts between friction and tread, but may not use in the manufacture of any tire or tire casing more Rubber or more whole-tire reclaimed rubber than would be used in the manufacture of such tire or tire casing if the above specifications for tread and friction were followed, after allowing for tolerances permitted.

(c) Capping Stock and Camelback

(1) Capping stock and camelback shall be manufactured only from compounds of grade C, as listed in subdivision (a) (1) of this list.
(2) Capping stock and camelback may be manufactured only in gages of 10/32, 12/32, 14/32, 16/32, 18/32, 20/32, 22/32, and larger.

(d) Maximum Material Volume of Tire Tubes

No tire tube of any of the classes listed below shall be manufactured with a material volume in excess of the volume specified for such class as set forth below opposite the description or designation of such class:

Description of Product Type	Size	Maximum Material Volume (in Cubic Inches)
Passenger automobile tire tubes	5.50-16	51.2
	CD-16	57.8
	6.50-15	66.6
	7.00-15	72.2
	D-16	72
	7.50-15	89.4
	7.50-16	93.2
	A-20/21	42.8
	B-17/18	46.9
	C-17	56.1
	7.00-17	75.2
	7.50-17	93.4
Truck tire tubes, 15- and 16-inch rims	6.00-16	65
	6.50-16	75
	7.00-15	85
	7.00-16	89
	7.50-15	103
	7.50-16	108
	9.00-16	191
	10.00-16	220
Truck tire tubes, 20-inch rims or larger	6.00-20	75
	6.50-20	102
	7.00-20	135
	7.50-20	175
	8.25-20	197
	9.00-20	235
	10.00-20	300
	11.00-20	350
	12.00-20	450
	13.00-20	525
	14.00-20	670
Agricultural equipment tires	4.00-12	25.3
	5.00-15	38.6
	6.00-9	36.8
	6.00-16	59.0
	DM-16	70.5
	6.50-32	137.8
	FM-24	153.5
	8.50-10	....
	9.00-28	223.0
	HM-28	302.0
	KM-28	414.0
	5-40	92.5
	5.5-40	92.5
	6-40	118.0
	7-32	112.0
	8-32	157.0
	9-32	220.0
	10-28	242.0
	11-28	302.0
	12-30	385.5
	13-30	440.0
	14-30	498.0
	15-30	595.0

Variations from the above maximum volumes shall be permitted to the extent of −3%.

Sizes not specifically set forth shall have maximum volumes proportionate to the sizes listed.

In the event that the maximum volume herein permitted for a tube of a given type and size manufactured by any Person on the effective date of this order is less than the maximum indicated above, such Person shall make no change in the maximum volume of such tube as then manufactured by him without the prior approval of the Director of Industry Operations.

The foregoing restrictions on material volume of tire tubes do not apply to tire tubes for use with mileage tires.

List 11

(Effective March 23, 1942)

Specifications for the manufacture of truck tire flaps.

In the manufacture of truck tire flaps to fill all orders, including War Orders, but excluding mileage accounts, the maximum amount of Rubber per flap shall not exceed the amount set forth in the following table opposite the description of each type and size of flap.

Tire Size	Rim Width	Rim Type	Maximum Amount of Rubber (in Pounds)	Remarks
6.00-15	4.50	Semi-Drop Center	.65	
6.50-16	4.50	Semi-Drop Center	.65	
7.00-16	5.50	Semi-Drop Center	.80	
7.50-16	5.50	Semi-Drop Center	.80	
6.00-16	4.50	Split Wheel	None (usually no flap is used)	
9.00-16	5.50	Split Wheel	1.75	Figures on crude rubber apply with or without bead lock
10.00-16	6.50	Split Wheel	1.75	
6.00-20	3.75	Conventional	.60	
6.50-20	3.75	Conventional	.60	
7.00-20	4.33	Conventional	.85	
7.50-20 8-ply	6.00	Conventional	1.15	
7.50-20 10-ply	5.00	Conventional	1.35	
8.25-20	5.00	Conventional	1.35	
9.00-20	5.00 6.00	Conventional	1.60	
10.00-20	6.00 7.33	Conventional	2.20	
11.00-20	7.33	Conventional	2.50	
12.00-20	8.37	Conventional	2.70	
13.00-20	8.37	Conventional	2.70	
14.00-20	8.37 10.00	Conventional	3.65	
7.50-20	6.00	Split Wheel	1.60	With bead lock the limits may be increased 10% because of additional length required.
8.25-20	6.00	Split Wheel	1.60	
9.00-20	6.00	Split Wheel	1.60	
12.00-20	10.00	Split Wheel	3.00	
14.00-20	10.00	Split Wheel	3.65	
9.00-13	(5.50 D.C.) (6.50 Split)		1.45	

Sizes not listed shall be in proportion to sizes shown.

In the event a manufacturer on February 15, 1942, was using less Rubber in any type or size of flap than the maximum amount listed above, he shall not increase the amount of Rubber which he uses in manufacturing flaps of the same type or size.

No. 2

Section 940.5 (Supplementary Order No. M-15-b-1) is hereby amended as follows:

1. By inserting the following new subparagraph immediately after subparagraph (b) (11) thereof:
   (12) Specifications for the manufacture of insulated wire and cable — List 12
2. By attaching thereto the attached additional list designated List 12.

This Order and the specifications set forth in the list attached hereto shall become effective on April 1, 1942.

Issued this 25th day of March, 1942.

J. S. Knowlson,
Director of Industry Operations.

List 12

(Effective April 1, 1942)

Specifications for the manufacture of insulated wire and cable.

(a) Compounds

For each per cent. of rubber by volume reduced, reclaimed and scrap rubber may be increased 2.5% by volume.

Type	Grade	Maximum % by Volume: Rubber	Maximum % by Volume: Scrap Rubber	Trade Identification
(1) Insulations	A	55	14	Performance type otherwise known as ASTM D-353-1941
	B	35	18	ASTM D-353-Emergency ASTM D-574 Code Grade 2/11/42
	C	13	60	
(2) Jackets	D	50	35	ASTM D-532-Emergency

(b) Insulated Wire and Cable

Insulations and jackets of each of the classes of wire and cable listed below shall be made from one of the grades of compounds listed in subdivision (a) of this specification, the appropriate grade of compound to be used for insulation or jacket being that hereinbelow specified therefor opposite the description or designation of such class.

(*Continued on page 83*)

Amendments to Supplementary Order No. M-15-b, to Restrict the Use and Sale of Rubber[1]

No. 5

Supplementary Order No. M-15-b is hereby amended by substituting the attached lists designated A, B, C, and D for lists A, B, C, and D, respectively, now attached to such Order.

This Order shall take effect on March 1, 1942.

Issued this 28th day of February, 1942.

J. S. KNOWLSON
Director of Industry Operations

LIST A (REVISED EFFECTIVE MARCH 1, 1942) TO SUPPLEMENTARY ORDER NO. M-15-B AS AMENDED

Group 1 ..... 125%
- Belt splicing and repair material
- Concentrator belts
- Conveyer belts
- Elevator belts
- Industrial brake linings and clutch facings
- Polishing belts
- Screen diaphragms

Group 2 ..... 100%
- Cleats and bucket pads
- Hatters' belts
- Last puller belts
- Pulley lagging
- Round belts
- Street sweeper belts

Group 3 ..... 100%
- V-belts (non-automotive)

Group 4 ..... 80%
- Flat transmission belts
- Hog beater belts

Group 5 ..... 125%
- Acid hose
- Chemical hose
- High pressure hose
- Jetting and hydraulic hose
- Railroad hose (all types)
- Rotary drillers hose
- Sand blast hose
- Wire braid hose

Group 6 ..... 100%
- Air drill hose
- Dredging sleeves
- Industrial vacuum hose
- Oil suction and discharge hose
- Pneumatic hose
- Spray hose (except low pressure)
- Steam hose
- Suction hose
- Welding hose

Group 7 ..... 80%
- Brewers' hose
- Gasoline and oil tank wagon hose
- Sanitary hose

Group 8 ..... 40%
- Fire and mill hose

Group 9 ..... 140%
- Rubber lined tanks, drums, pipes, and fittings (hard and soft)

Group 10 ..... 100%
- Hard rubber pipe and fittings
- Rubber buckets, pails, dippers, funnels, measures, bottles, beakers, frames, baskets, racks, trays (for handling corrosive materials)
- Rubber-insulated fume-ducts, fans, racks, frames, trays, screens, pipe, buckets, pails, dippers, agitators, funnels, and measures (for handling corrosive materials)
- Rubber pumps, pump lining, valves and parts
- Rubber covered rolls and roll coverings (except wringers, printers, fingerprint, and business machines)

Group 11 ..... 125%
- Storage battery parts (including only separators, retainers, binding strips, element support rods, tie rods, plate support rods, hand-built jars and containers excepting those for automotive starting and lighting batteries)
- Hard rubber sheets, rods, and tubing (for dielectric purposes)
- Insulated tools
- Magneto parts
- Mine safety battery parts
- Mine safety lamp parts
- Respirators, hose masks, gas masks, goggles, inhalators, skull guards (mining and industrial types)

Group 12 ..... 125%
- Cable splicing compound (including necessary cement)

Group 13 ..... 100%
- Chute lining (including lining for sand-blast chambers)
- Oil well specialties (packers, testing, lining, bumper, and swab rubbers; blow-out preventers; drill pipe protectors; stabilizers; slush pump pistons and liners; mud and oil pump pistons and liners; mud and oil pump pistons, valves, and parts; valve cups; strippers; stuffing box rings)
- Press die pads
- Sheet, strip, and mechanical packings
- Vibration dampers (non-automotive)

Group 14 ..... 100%
- Airplane deicer parts
- Card clothing
- Gaskets and washers (not elsewhere listed) necessary for use for products in lists "A", "B", "C", and "D"
- Gas main bags
- Hat forming bags
- Lineman's protective devices (line hose, insulator hoods, blankets, cable and test caps and separators, insulating stools)
- Locomotive drive units
- Loom pickers, lug straps, bumpers, holdups, and spinning cots
- Mine ventilating tubing
- Molded, extruded, and lathe-cut goods and tubing (not elsewhere listed) constituting component parts of machinery for the processing and fabrication of raw and semi-finished materials and for the transmission of mechanical power
- Pipe coupling rings
- Pipe lining disks
- Shoe diaphragms
- Stuff pump balls

Group 15 ..... 80%
- Finger print rolls
- Cutting rubbers
- Offset and newspaper blankets
- Printing plates (including cements, but excluding rubber stamps, box dies, band daters, and toy stamps)
- Printers' rollers
- Suction cups for printers' equipment
- Rubber solution for wet plate negatives

Group 16 ..... 40%
- Engravers' rubber (including necessary cements)

Group 17 ..... 140%
- Couplings for pasteurizers and milk-bottle and can washers
- Gaskets for milk separators and clarifiers
- Milk-bottle filler rubbers
- Milking-machine inflations and tubing

Group 18 ..... 160%
- Abrasive wheels

Group 19 ..... 70%
- Flush valve balls
- Washers, including fuller balls and diaphragms, for controlling the flow of fluids
- Water meter parts

Group 20 ..... 50%
- Vacuum cleaner belts

Group 21 ..... 25%
- Switchboard mats and matting

Group 22 ..... 20%
- Wringer rolls

Group 23 ..... 75%
- Automotive parts:
  - Hydraulic brake cylinder parts, excepting boots
  - Hydraulic brake hose
  - Air brake vacuum brake parts, excepting boots
  - Air brake and vacuum brake hose
  - Torsional vibration dampers
  - Clutch facings, brake linings, and brake blocks
  - Shock absorber bushings
  - Steering post alignment bushings
  - Pitman arm bushings for independent suspensions
  - Steering box-to-frame pads for independent suspensions
  - Windshield wiper blades and pivot to housing gaskets
  - Suspension and torque arm bushings
  - Engine, transmission, and propeller center bearing mountings
  - Remote control gearshift bushings
  - Spring bumpers—front and rear
  - Cements and tie-guns (for bonding rubber to metal only)
  - Sealed beam gaskets
  - Hydraulic clutch and throttle controls

Group 24 ..... 30%
- Automotive fan belts (for trucks, buses, tractors and farm implements)

Group 25 ..... 100%
- Full-circle and sectional airbags (for repairing, retreading, and recapping tires

Group 26 ..... 150%
- Electricians' gloves (including seconds)

Group 27 ..... 200%
- Commercial diving equipment

Group 28 ..... 100%
- Acoustic aids
- Blood pressure bags
- Brain surgery caps
- Breast pumps
- Colostomy outfits
- Dental separating strips and mouth props
- Dilators
- Evacuators
- Finger cots (medical, surgical, dental, veterinary and laboratory)

[1] Title 32—National Defense, Chapter IX—War Production Board, Subchapter B—Division of Industry Operations. Part 940—Rubber and Products and Materials of Which Rubber Is a Component.

Inhalation bags and face pieces (medical, surgical, dental, and veterinary)
Invalid rings
Irrigators and hard rubber syringes
Medicine droppers
Nipples (feeding)
Operating cushions
Orthodontia bands
Parts for medical, surgical, dental, veterinary, and mortuary instruments
Pessaries and prophylactics
Prostatic bags
Rubber bands for artificial limbs
Rubber denture, denture suctions, and model formers
Surgeons' gloves (medical, surgical, dental, mortuary, and veterinary use)
Surgical tape, medicated footpads, and plasters
Tourniquets
Tubes, tubing, including catheters, stopples, and rubber policemen, (medical, surgical, dental, mortuary, veterinary, and laboratory)
Umbilical belts
Urinal—individual wear
Vaccine caps
X-ray sheets, gloves, aprons, and cooling hose

Group 29 ..... 75%
Bulbs (medical, surgical, dental, mortuary, veterinary, and laboratory)
Water bottles and combination syringes

Group 30 ..... 50%
Dental dam
Fountain syringes
Hard rubber pipe connections, and accessories (medical, surgical, dental, mortuary, and veterinary)
Hospital sheeting (hospital, ambulance, mortuary, and first-aid use only)
Ice bags
Metatarsal cushion or pad (not part of shoe)
Truss pad cover

Group 31 ..... 50%
Cements for the manufacture and repair of shoes (but not the manufacture of component parts, except gem duck and leather welting)

LIST B (REVISED EFFECTIVE MARCH 1, 1942) TO SUPPLEMENTARY ORDER NO. M-15-B AS AMENDED

Group 1
Compounds for insulating wire and cable

Group 2
Rubberized fabric for heating pads

Group 3
Rubberized fabric for firemen's and policemen's clothing and occupational protective clothing, other than footwear and gloves, consisting of industrial pants, coats, jackets, hats, and aprons

Group 4
Waterproof boots, pacs, arctics, gaiters, and overshoes, (for other than severe occupational uses provided for in Group 5)

Group 5
Steel toe, conductive tread and other boots, mine pacs, and heavy waterproofed work shoes

Group 6
Vulcanizing materials, patches, blow-out shoes, and similar items for repair of tires and tubes, and cements for repair or retreading of tires and repair of tubes

Group 7
Thread for:
Industrial shoes, belting, and flexible metallic hose
Repair cords and webs
Sanitary belts
Supporters (men's athletic)
Surgical elastic bandage
Surgical stockings
Surgical supports for abdomen, back, and breast
Suspensories
Trusses

Group 8
Container sealing compounds
Jar rings
Sealing gaskets (cut rings)

Group 9
Pneumatic, solid, and cushion tires and tubes (including flaps, cements, airbags, and valves) of the following types:
Passenger car
Truck and bus (including road-builder, earth mover, and excavator)
Industrial (power-driven vehicles only)
Agricultural
Motorcycle
Bicycle
Airplane

Group 10
Camelback, capping stock, filler strip, stripping stock, cushion stock, lug stock, and base stock for retreading and recapping tires

LIST C (REVISED EFFECTIVE MARCH 1, 1942) TO SUPPLEMENTARY ORDER NO. M-15-B AS AMENDED

Group 1 ..... 100%
Blood pressure bags
Colostomy outfits
Finger cots (medical, surgical, dental, mortuary, and veterinary use)
Inhalation bags and face pieces (medical, surgical, dental, laboratory and veterinary)
Irrigators
Nipples (feedings)
Operating cushions
Pessaries and prophylactics
Prostatic bags
Sinus and cautery bulbs
Surgeons' gloves (medical, surgical, dental, mortuary, and veterinary use)
Tubes, tubing, including catheters (medical, surgical, dental, mortuary, veterinary, and laboratory use)
Urinals, individual wear
Veterinary sleeves

Group 2 ..... 85%
Flat belts
Round belts
V-belts (non-automotive)

Group 3 ..... 50%
Cements for the manufacture of shoes (but not for the manufacture of any component parts except gem duck and leather welting)

Group 4 ..... 25%
Latex insulation for fume ducts, fans, racks, frames, trays, screens, pipes and fittings, buckets, dippers, funnels, measures, drums, pumps, valves, baskets and agitators (for handling corrosive material)

Group 5 ..... 50%
Industrial rubberized fabric gloves for handling corrosive materials
(Percentage to be reduced to 20% April 1)

LIST D (REVISED EFFECTIVE MARCH 1, 1942) TO SUPPLEMENTARY ORDER NO. M-15-B AS AMENDED

Group 1
Container sealing compounds

Group 2
Compounds for treating tire cords

Group 3
Meteorological balloons

No. 6

Section 940.3 (Supplementary Order No. M-15-b) is hereby amended as follows:

1. By changing subparagraph (a)(6) to read as follows:
   (6) "Consume" means to use, process, stamp, cut or in any manner change the form, shape or chemical composition of any Rubber, Latex, or Reclaimed and Scrap Rubber.
2. By inserting immediately after subparagraph (a)(6) thereof the following new subparagraph designated (a)(7):
   (7) "Reclaimed and Scrap Rubber" means all rubber and products and by-products of rubber commonly known as scrap rubber, whether vulcanized or not and whether or not contained in any mixture or compound, and all rubber reclaimed by any process, but does not include Rubber or Latex as defined in subparagraph (a)(1) hereof, balata, gutta-percha, gutta siak, gutta jelutong, or pontianak.
3. By changing paragraph (h) thereof to read as follows:
   (h) Limitation of inventories. No Person shall purchase or receive delivery of Rubber, Latex, or Reclaimed and Scrap Rubber or products thereof, in the form of raw materials, semi-processed materials, finished parts or sub-assemblies, in quantities which shall result in an inventory of such material in excess of a minimum practicable working Inventory, taking into consideration the limitations placed upon the production of Rubber, Latex, and Reclaimed and Scrap Rubber products by this Order. An Inventory of Rubber or Latex in excess of a quantity reasonably expected to last not more that sixty days shall be deemed to be in excess of a practicable working Inventory unless otherwise specifically authorized by the Director of Industry Operations or the Rubber Reserve Company. An Inventory of Reclaimed and Scrap Rubber in excess of a quantity reasonably expected to last not more than sixty days shall be deemed to be in excess of a practicable working Inventory unless otherwise specifically authorized by the Director of Industry Operations; provided that this restriction on Inventories of Reclaimed and Scrap Rubber shall not apply to any person engaged in the business of reclaiming rubber.
4. By inserting immediately after paragraph (j) the following new paragraphs designated (k), (l), (m), and (n):
   (k) *General restriction on the acquisition of Reclaimed and Scrap Rubber.* No Person shall purchase, accept delivery of, or otherwise acquire any Reclaimed or Scrap Rubber for any purpose except for the purpose of consuming the same in the manufacture of any of the products hereinafter permitted by paragraph (1); provided that nothing in this Order shall prevent any dealer in scrap rubber from acquiring Reclaimed and Scrap Rubber in the usual course of his business for the purpose of selling the same to another dealer in scrap rubber or to any manufacturer of rubber products.
   (l) *General restriction on the consumption of Reclaimed and Scrap Rubber.* After March 31, 1942, no Person

shall consume any Reclaimed and Scrap Rubber for any purpose except [subject to the provisions of paragraph (d)] one or more of the following:

(1) To manufacture any of the products for which Rubber or Latex may be consumed under the provisions of paragraph (b) and (c) hereof; provided that no Person shall consume any Reclaimed and Scrap Rubber to fill any War Order until he has forwarded to the Rubber and Rubber Products Branch of the War Production Board a report complying with the requirements of subparagraph (b)(1).

(2) To manufacture products of the groups listed in List E; provided that no Person shall consume more Reclaimed and Scrap Rubber during any calendar month in the production of any such group of products than a quantity determined (by weight) as follows:

(i) Ascertain the average monthly consumption of Reclaimed and Scrap Rubber consumed by such Person in the manufacture of products of the same group during the last three months of the year 1941;

(ii) Add to the amount so ascertained an amount equal to 166⅔% of the amount (if any) of the average monthly consumption of Rubber and/or Latex by such Person in the manufacture of such group of products during such three months' period;

(iii) Multiply the amount determined pursuant to subparagraph (ii), above, by the appropriate percentage, the percentage for each group of products being that set forth in List E opposite the heading of such group.

(3) To manufacture products of the groups listed in List F; provided that no person shall consume more Reclaimed and Scrap Rubber during April, 1942, in the production of any such groups of products than a quantity determined (by weight) as follows:

(i) Ascertain the average monthly consumption of Reclaimed and Scrap Rubber consumed by such Person in the manufacture of products of the same group during the last three months of the year 1941.

(ii) Add to the amount so ascertained an amount equal to 166⅔% of the amount (if any) of the average monthly consumption of Rubber and/or Latex by such Person in the manufacture of such group of products during such three months' period;

(iii) Multiply the amount determined pursuant to subparagraph (ii) above, by 60%.

Provided further, that beginning May 1, 1942, no Person shall consume any Reclaimed and Scrap Rubber for any such purpose without the prior approval of the Director of Industry Operations.

(m) *Limitation on consumption of Reclaimed and Scrap Rubber during March, 1942.* No Person shall consume Reclaimed and Scrap Rubber during that part of the month of March, 1942, remaining after the effective date of this Order, in making any product, whether set forth in Lists E and F or not, at a rate in excess of his consumption of Reclaimed and Scrap Rubber in making similar products during the corresponding portion of the month of February, 1942.

(n) *General restriction on the destruction of certain rubber articles.* No Person shall, unless expressly permitted by the Director of Industry Operations, destroy by burning or any other means, all or any part of any tire, tire casing or tire tube, or any waterproof footwear, heel, sole, hose, belting, or storage battery box, whether worn out or not, which is composed in whole or in part of any kind of rubber [including, but not limited to Rubber and Latex, as defined in paragraph (a) hereof, scrap rubber, reclaimed rubber, any synthetic rubber], except in the following cases:

(1) The consumption of any such article by any manufacturer of rubber products as a necessary incident to his manufacturing operations.

(2) The consumption of any such article by any Person engaged in the business of reclaiming scrap rubber as a necessary incident to such reclaiming operations.

(3) The destruction of any such article (without destroying the rubber therein) for the purpose of selling its component parts to any Person engaged in the business of reclaiming rubber, or to a dealer in scrap rubber for resale by him to a Person engaged in the business of reclaiming scrap rubber.

This Order shall be effective as of the date of its issuance.

Issued this 20th day of March, 1942.

J. S. KNOWLSON
Director of Industry Operations

LIST "E" TO SUPPLEMENTARY ORDER NO. M-15-B, AS AMENDED

Group 1 Heels, heel bases, soles, soling strips, taps, toplifts, toplifting material (black only)	50%
Group 2 Insoles, midsoles, welting, box toes, shoe bottom fillers, shoe tapes, rope soles	50%
Group 3 Rubber-soled fabric-top footwear, without heels (black soles, toe caps, and foxings only); provided that no reclaimed and scrap rubber shall be consumed in the manufacture of any products in this group after May 31, 1942	100%
Group 4 Hose (including water, garden, low-pressure spray, curb line and garage air, car heater, automotive radiator and fire extinguisher tubing, and other hose not permitted in List "A"	30%
Group 5 Friction tape	50%
Group 6 Erasers (except pencil plugs and pencil caps)	30%

LIST "F" TO SUPPLEMENTARY ORDER NO. M-15-B, AS AMENDED[1]

Group 1
Automotive parts (including only weatherstrip and channel filler, tail-pipe supports, battery drain tubes, brake boots, nipples for high-tension wiring)

Group 2
Containers for automotive SLI Batteries (S.A.E. Group 4 and larger and motorcycle types only)

Group 3
Automotive storage battery covers, vents, gaskets, and bushings

Group 4
Automotive fan belts

Group 5
Typewriter platens and business machine rolls

Group 6
Parts for business machines (except platens and rolls)

Group 7
Parts for refrigerators, washing machines, and motor-driven electric appliances

Group 8
Stamp pad cushions

Group 9
Plumbers' suction cups

Group 10
Adhesives, gaskets and compounds for sealing bags and bagging, packages, drums, and pails.

Group 11
Barrel lining

Group 12
Crutch tips and pads

Group 13
Brush-setting compounds

Small-Farm Rubber Production[1]

In the development of rubber production in Latin America, small plantings of this crop will undoubtedly play an important role. While government and private agencies have already made large plantings in several countries of Central and South America, the plan is to encourage local farmers to use these central plantations as sources of material for their own plantings. All of the steps in transforming latex into dry rubber are so simple that the process may be carried out as readily on a small plantation as on a large one. There is, in fact, no tropical crop that is more suitable for small-farm production.

The Goodyear Rubber Plantations Co. has for several years tested small-unit rubber production on its Speedway Estate at Cairo, Costa Rica, using simple, inexpensive equipment of the sort available to almost any farmer in tropical America. This equipment consists of such materials as discarded kerosene cans and oil drums, bits of scrap metal, hand-made wooden paddles, and smokehouses of rough materials of local origin. Experience has shown convincingly that crude rubber of top quality can be produced in this manner with an investment in equipment of no more than perhaps $50. Interplanting with other crops, besides reducing soil erosion between rubber trees, provides both subsistence and a cash income for the grower while he is waiting for the rubber trees to mature.

[1] Abstracted from an article by W. E. Klippert in *Agriculture in the Americas*, Mar., 1942, pp. 48-53.

EDITORIALS

Integrate Our Rubber Program

ANYONE who has tried during the past few months to evaluate sanely our rubber position has been confronted with a maze of conflicting opinions, rumors, and wild guesses. Some have come from responsible sources in government and in the industry, and others from less competent sources. We hear of congressional investigations that will blow the lid off the rubber situation; we hear of one or another person or faction being blamed for our present plight. Some hold that synthetic rubber is the entire answer to our dilemma; others believe that reclaim is the major solution; still others concentrate their attention on Western Hemisphere natural rubber. First we hear that there is plenty of scrap rubber; then we learn there is actually a shortage.

The same relative degree of discord is found regarding demand. How much rubber will be needed for the armed services of the United Nations, how much for essential civilian use? There have been many guesses, many estimates—all of them different. In short our rubber situation has been in a state of confusion and chaos; we have been faced with a division of authority. Meanwhile the Japanese have grabbed most of our normal sources of supply.

One of the basic causes for this division of opinion and authority, to our belief, lies in the multitude of government agencies concerned in one way or another with rubber. In recent testimony relating to the Department of Agriculture's 1943 appropriation bill, Dr. E. C. Auchter, chief of the Department's Bureau of Plant Industry, cited 17 different government agencies giving attention to rubber: Department of Agriculture; Coordinator of Inter-American Affairs; Rubber Reserve Co.; Army and Navy Munitions Board; War Production Board; Defense Supplies Corp.; the former Office for Production Management; Office of Price Administration; Department of Commerce; National Bureau of Standards; U. S. Tariff Commission; Bureau of the Census; Treasury Department; U. S. Post Office; Department of Labor; Army; and Navy.

Many of these agencies have been mushrooming up throughout Washington, reaching a tremendous size and representing a wide diversity of interests as far as methods of solving our rubber problems are concerned. Each is applying its efforts in its own sphere. For example, the Defense Supplies Corp. places emphasis on synthetic rubber; the Department of Agriculture stresses guayule and other natural rubber sources in this hemisphere; the War Production Board sharply restricts rubber consumption; while the Office of Price Administration rations tires. Certainly all these activities are necessary, but there has not been enough coordination of effort to dispel the confusion and division of authority that has existed.

Out of this muddle last month came Leon Henderson's concise statement on our rubber supplies and needs, projected into 1944. This first sincere attempt to present a comprehensive picture of our critical rubber position deserves high praise. We have something, at least temporarily, to serve as a basis for our future rubber program. To secure the tabulated data which Mr. Henderson presented must have required a large measure of cooperation among the various supply and demand factors involved. But there is no indication that this was but a temporary move, forced by the demand for a clarification of the conditions indicated above.

As we go to press, we learn that Donald M. Nelson, War Production Director, has just appointed Arthur B. Newhall, chief of WPB's Rubber and Rubber Products Branch, as coordinator for rubber, with sweeping powers to direct the use, control, or production of natural and synthetic rubber. In his new position Mr. Newhall will be concerned with the production of synthetics, the building up of the rubber stockpile, the rubber activities of the WPB, and the coordination of tire rationing with the overall rubber program. He will also direct rubber salvage operations, military and civilian allocations, and priorities. To do all this he must have the full cooperation of all the various agencies concerned. We should stop the bickering and blaming, forget why we haven't enough rubber, and get on with building up our rubber supplies. Our entire rubber program should be integrated into a unified whole now.

"War Orders"

A CERTAIN amount of confusion has arisen in connection with the interpretation of "War Orders" as this term is used in Amendment No. 3 to Supplementary Order No. M-15-b (see INDIA RUBBER WORLD, February 1, 1942, p. 484). In formulating this document the War Production Board intended that the rubber manufacturer should take *very literally* the definition of a "War Order" as contained in the amendment.

Apparently the basic difficulty regarding this question of "War Orders" arises from a misunderstanding of the War Production Board's purpose in segregating "War Orders" from other orders in the amendment. This was done because the Army, the Navy, Lease-Lend, etc., for whom the "War Orders" are released, have received definite allocations of rubber, and the separate reporting of "War Orders" provides a means of accurately accounting for these allocations. Lists A, B, C, and D, on the other hand, provide for definite allocations of rubber for other than "War Orders."

This does not mean that in all cases "War Orders" are more vital to the functioning of the war effort than some products not called "War Orders" according to M-15-b. But the vital nature of a product must not confuse a manufacturer and cause him to consider an order a "War Order" if it is not literally such an order as defined.

What the Rubber Chemists Are Doing

Rubber Division, A. C. S., Activities

New York Group Hears Elliott and Mark

THE spring meeting of the New York Group, Rubber Division, A. C. S., was held March 20 at 4.00 p.m. in the clubrooms of the Building Trades Employers' Association, 2 Park Ave., New York, N. Y. About 300 members and guests heard the feature speakers, P. M. Elliott, of the Naugatuck Chemical Division of the United States Rubber Co., and H. Mark, professor of organic chemistry at the Polytechnic Institute of Brooklyn.

Dr. Elliott in his talk, "Position of Reclaimed Rubber in a War Economy", outlined the rubber needs and possible sources of supply of the United Nations in 1942 and 1943 and the factors admitting and restricting the use of reclaim in the defense program. He also discussed the principles of compounding reclaim, pointing out that reclaim in general is handled in much the same way as crude rubber in respect to compounding ingredients. It was emphasized, however, that in developing reclaim compounds from crude rubber formulations the replacements should be on the basis of rubber hydrocarbon content. Crude rubber is considered to have a rubber hydrocarbon content of 100%; whereas the percentage in reclaim is much lower and is usually specified by the reclaimer. Particular emphasis was placed on the selection of the type of reclaim and the wide range of properties available in the many types produced. In this connection the variations possible through the choice of the basic reclaiming process—alkali, acid, and heater methods—were cited, as well as the variations obtained through modifications in the basic process and through the selection of the type of scrap rubber used. The influence of these variables on the processing qualities and physical properties of the finished reclaim was discussed briefly. The talk was accompanied by a series of slides showing reclaim manufacture as practiced at the Naugatuck plant.

An abstract of Professor Mark's address, "Fundamental Aspects of the Synthetic Rubber Program", follows:

Natural rubber is a polymeric hydrocarbon, built up by long-chain molecules in which isoprene residues are consecutively linked together by homopolar covalent linkages having a continuous cis-configuration in respect to the remaining double bonds. This structure accounts for the main mechanical and chemical properties of rubber, such as high range; low modulus elasticity; reenforcement upon stretching; vulcanizability; water-, alkali-, and acid resistance; etc. It also is responsible for certain technical deficiencies of natural rubber such as poor resistance to oxygen, oil, gasoline, and light.

Recent progress in the chemistry of high polymers has established certain general relations between the molecular structure of long-chain compounds and their technical properties. To characterize the molecular structure certain old methods had to be improved and new ones developed. The most important of them are the measurement of the osmotic pressure and the viscosity of highly diluted solutions, the determination of the sedimentation velocity in the ultra-centrifuge, the application of fractionated precipitation, and the use of X-rays for the determination of the orientation and crystallization in the solid state.

The main features of the structure of a given sample are: (a) The chemical nature of the material (hydrocarbon, alcohol, ester, ether, etc.) (b) The average molecular weight of the substance. (c) The distribution curve of the molecular chain length. (d) The internal flexibility of the long-chain molecules. (e) The amount of orientation and crystallization of the chains.

It was shown how these characteristics of a high polymeric material can be connected with technical properties such as elasticity, resilience, vulcanizability, and resistance to oxygen, light, and other chemicals, etc.

Dinner was attended by 262. At the short business meeting that followed, Chairman F. E. Traflet introduced H. I. Cramer, secretary of the Rubber Division of A. C. S., and stated the decision by a vote of 95 to 71 to substitute a technical meeting for the annual summer outing. The date of the meeting will be set later. Rules for the 1942 Prize Essay Contest for members of the New York Group under 35 years of age were announced. Those planning to submit technical papers must indicate their intention and submit titles on or before August 19. The meeting was concluded with the showing of two sound films, "Eyes of the Navy" and "American Sea Power", which pictured the training of aircraft pilots at Navy base schools, life aboard ship, and naval war maneuvers at sea.

Los Angeles Group Sees Plastics Film

THE seventy-sixth meeting of the Los Angeles Group, Rubber Division, A. C. S., held March 3 at the Mayfair Hotel, Los Angeles, Calif., was attended by 116 members and guests. After dinner interesting news items were given by John Hoerger, current events chairman. Questionnaires concerning the 1942 summer outing were distributed, and a report of the collected data will be made at the next directors' meeting. C. A. Lamb, Sr., made a motion that a committee be appointed to represent the Group in priorities' matters before the War Production Board. The motion will be further discussed by the directors.

The evening program included a sound film in color showing the varied development of plastic materials and the articles made from them, which was presented by M. A. Collins, of the Plastics Industry Technical Institute. R. A. Goodcell, of the Automobile Club of Southern California, discussed the historical development of California under 12 flags.

The door prize, a $25 defense bond donated by the Group, was won by C. A. Parrish (United States Rubber Co.). Winning numbers for the special prizes, six handsome billfolds donated by the Williams Clark Co., Wilmington, Calif., through the courtesy of J. A. Clark, were drawn by Jesse Bass (Harvard Tire Co.); H. L. Oak (United Carbon & Pigment Co.); C. A. Lamb, Jr., (Bette's Rubber Co., Ltd.); Arthur Wolf (New Jersey Zinc Co.); Victor Vodra (R. T. Vanderbilt Co., Inc.); and R. O. Wade (Los Angeles Standard Rubber Co.). Table favors, supplied by Johnson Steel & Wire Co., were 18-pound and 27-pound wire fishing leaders. After dinner cigars were passed through courtesy of Charles Kipple, of the Stauffer Chemical Co.

Detroit Group Meets

THE Detroit Rubber & Plastic Group meeting at the Hotel Detroit Leland, Detroit, Mich., February 27, was attended by about 150 members and guests. In an address, "Rubber and Plastics in the Aircraft Industry", George DeBell, chief engineer, Thomas Mason Corp., discussed the numerous recent developments of rubber and plastics parts for aircraft.

New officers of the group include J. H. Doering, chairman (Ford Motor); W. B. Hoey, vice chairman (Bakelite); E. J. Kvet, secretary-treasurer (Baldwin Rubber); W. G. Nelson, counselor (U. S. Rubber); E. F. Riesing, publicity chairman (Firestone). Other members of the executive committee are: F. Wehmer (Minnesota Mining); J. C. Dudley (Chrysler); J. R. Shroyer (R. T. Vanderbilt); J. Miller (Durez Plastics); and W. M. Phillips (General Motors).

Akron Group Elects Officers

THE Akron Group, Rubber Division, A. C. S., met March 20 at the Akron City Club, Akron, O., with 200 members and guests attending. Entertainment during the cocktail and dinner hours was furnished by The Co-Eds, and there were special dance numbers by members of the orchestra.

Mr. Weitz, of General Electric Co., spoke on "Applications of Radiation

from Filament and Gaseous Discharge Sources." He demonstrated newer types of lighting and discussed their value in the field of illumination. The kinds and degrees of light available for effective blackouts were also described.

Officers elected for 1942-43 were T. L. Stevens, chairman (C. P. Hall); A. E. Sidnell, vice chairman (Seiberling); and W. J. Krantz, secretary-treasurer (Goodyear).

Buffalo Group Hears Wiegand

THE Buffalo Group, Rubber Division, A. C. S., met at the Hotel Westbrook, Buffalo, N. Y., February 27. Fifty members were present. W. B. Wiegand, of the Columbian Carbon Co., presented a paper, "Colloidal Carbon as Revealed by the Electron Microscope", and W. A. Ladd, of the same company, described the construction and operation of the electron microscope. Dr. Wiegand's address included a discussion of the relation of carbon surface area to tread quality of tires and suggested the usefulness of the electron microscope in the problems of rubber technology, such as reenforcement, loading capacity, and processing behavior.

The joint meeting of the Buffalo and Canadian groups will be held at the General Brock Hotel, Niagara Falls, Ont., Canada, April 30. The speaker and his subject will be announced later.

Boston Group Meets April 10

J. W. BICKNELL, managing director, Plantations Division, United States Rubber Co., and P. M. Elliott, of the Naugatuck Chemical Division of the same company, will be the speakers at the spring meeting of the Boston Group, Rubber Division, A. C. S., at the University Club, Boston, Mass., April 10 at 6.30 p.m. Dr. Elliott's subject is "Position of Reclaimed Rubber in a War Economy", and Mr. Bicknell will discuss recent developments in the Far East with reference to rubber plantations and the future of rubber cultivation in the western hemisphere. Both talks will be illustrated, and the Esso-Thaw Expedition films on India and the Khyber Pass will also be shown.

C. W. Christensen, treasurer, Rubber Division, A. C. S., c/o Monsanto Chemical Co., 1012 Second National Bank Bldg., Akron, O., wishes to buy copies of the January, 1941, issue of *Rubber Chemistry and Technology*. He will pay $1 each for copies in good condition delivered to his office.

Correction

THE author of "Firestone High-Frequency Torsion Tester", on page 570 of our March issue, calls our attention to an error in his copy. In the expressions for Cyclic Efficiency and Hysteresis Loss/Cycle the fractions have been inverted.

A.S.T.M. Makes Changes in Rubber Test Methods to Save War Materials

THE 1942 A.S.T.M. Committee Week and Spring Meeting held in Cleveland, O., March 2 to 6, was featured by numerous actions on important specifications and test methods to meet emergency situations. More than 520 technologists active in the materials fields were present for the 150 meetings, and attendance was particularly notable in such branches as rubber products, petroleum, and steel.

Committee D-11 on Rubber Products approved numerous alternate emergency provisions. These actions include a reduction in the electrical and physical properties which must be met by the rubber compounds for insulated wire and cable, class AO, 30% Hevea type, with related action in heat-resisting rubber compound wire and cable and the ozone-resistance type of insulation. As an example of reduction in physical properties in D353-41, Performance Rubber Compound, the tensile strength for rubber insulation is being reduced from 1,200 to 850 psi, and the electrical constant lowered from 4,000 to 2,000.

To make available requirements for rubber sheath for cords and cables for use where extreme absorption is not encountered, a complete emergency alternate specification was approved setting up a tensile strength minimum of 1,200 psi, a maximum set in two-inch gage length of ⅜-inch. Elimination of the tensile stress requirement (500 psi minimum at 200% elongation) and reduction in the aging requirements were set up for so-called tough jacket compound covered by Standard D 532. This specification requires a minimum tensile strength of 3,500 psi and ¼-inch set.

Tests for cord belting are under consideration, and the research work on abrasion tests for rubber products is to be continued. The work of developing tests of adhesive strength of rubber and rubber-like films is being advanced, and special work will be done on adhesion tests in conjunction with cemented balloon seams. The section on physical testing will attempt to complete a new round-robin test program on tensile testing hard rubber so that the results can be presented at the annual meeting.

The subcommittee concerned with rubber products for absorbing vibration approved as an emergency measure the report of Technical Committee A (jointly sponsored by A.S.T.M. and the Society of Automotive Engineers) covering automotive rubber. Details of the recommended proposed method of test using the durometer will be published in the March *ASTM Bulletin*.

The report on "Accelerated Light Aging of Rubber" presented by J. H. Ingmanson, chairman of the Subcommittee contained extensive tabular data and diagrams and was said to represent a very substantial beginning of active progress and advancement in this field. Ten laboratories cooperated in the work using three existing commercial machines. Some outdoor exposure tests were conducted. Materials covered included neoprene, tire tread, hose cover, sidewall, and insulation.

Another phase of the aging program concerned the correlation of results of temperatures of 70° C. with 80° C. in the bomb aging test (D 572). The existing requirement of 70° C. is to be retained, but revisions will be proposed in the methods so that an 80° C. temperature will be incorporated as alternate in the oxygen bomb test (D 572) and 90° C. alternate in the oven method (D 573) as compared with the present 70° C. operating temperature.

The committee plans to develop emergency alternate specifications on fire hose after the section in charge has reported on planned revisions.

The A.S.T.M. has streamlined its standardization procedure and in the next few weeks a large number of emergency alternate provisions will be issued to expedite procurement or conserve critical materials. Gummed stickers will be sent to all who use the "Book of A.S.T.M. Standards." The provisions will also be published in the *ASTM Bulletin*.

Ontario Group Hears Crosby

THE Ontario Rubber Section, Canadian Chemical Association, held a dinner-meeting March 19 at the University of Toronto, Toronto, Ont. J. W. Crosby, sales manager, Thiokol Corp., in his lecture, "Synthetic Rubber—Its Position in the Rubber Industry and Its Uses in War Time", discussed the development of vulcanizable types of synthetic rubber, their advantages and disadvantages, and the service conditions they must meet in war use applications. While production of these synthetics in recent years was for special products for which natural rubber would not serve so well, Mr. Crosby suggested that these oil-resisting types will now have to be used where they are most needed in the war effort, even though these applications do not utilize their special properties such as oil resistance.

J. A. Martin, Canadian Deputy Rubber Controller, reviewed the effect of the present rubber supply on the production of rubber goods.

R. I. Rubber Club Meets

THE spring meeting of the Rhode Island Rubber Club held March 20 at the Narragansett Hotel, Providence, R. I., was attended by 66 members and guests. A. C. Neal, Professor of Economics, Brown University, spoke on "The Economic Impact of the War and the Post-War Outlook." After the dinner door prizes, donated by Continental Carbon Co., Wishnick-Tumpeer, Inc., American Zinc Sales Co., and Rubber Service Department of Monsanto Chemical Co., went to lucky-number holders.

Regional Agricultural Laboratories in National Defense

HENRY G. KNIGHT, chief, Bureau of Agricultural Chemistry and Engineering, U. S. Department of Agriculture, Washington, D. C., discussed the function of the Department's regional laboratories in aiding national defense before the Eighth Annual Chemurgic Conference at the Stevens Hotel, Chicago, Ill., March 25.

Excerpts of Dr. Knight's talk relating to rubber follow:

A development that looks promising at this time is the possibility of producing fire hose without the use of rubber and linen. The hose used by fire departments consists of a circular woven cotton fabric *lined* with *rubber* which is now about as valuable as gold. Then there is the *unlined* fire hose, kept for emergency use in industrial plants and other buildings, that is made of linen, a commodity which we can't get now in sufficient quantities on account of the war. Last September the Civilian Defense Administrator requested us to investigate the possibility of making a fire hose wholly from domestic materials that will be leak-proof and strong enough to meet the demands for both types of service. Our technologists believe that a pliable plastic-lined hose of proper design can be developed which will be equal and probably superior to the present rubber-lined type. The plastic-lining phase of this work is being done by a large manufacturer of cotton fire-hose yarn, and the results obtained appear very promising indeed. Our chemists and cotton technologists are also working with various chemical treatments and fabric designs to see if it will be possible to develop an unlined cotton fire hose to replace hose formerly made of linen, where the pressures are comparatively low. If these efforts are successful, this country will not only be able to lick the rubber problem as it applies to fire hose, but another step will have been made in finding new and wider uses for farm crops.

From dipentene (derivable from turpentine) is now being made a chemical known as isoprene which is valuable as a synthetic rubber intermediate. In the present acute rubber shortage, all possible synthetic rubber intermediates are of great potential value. Isoprene is not the only derivative of turpentine that might serve to supply such intermediates. Recently the Bureau reported on experiments with thermal isomerization derivatives of turpentine, comprising conjugated chain trienes which also have potentialities in the synthetic rubber field. These also show interesting possibilities in the drying oil and synthetic resin fields.

And, of course, you know from what you have seen in the papers that we are working on synthetic rubber in one of the laboratories. I can't tell you much about that project because it is of a confidential nature. I can tell you that our most promising prospect is in the production of what scientists call a rubber extender. By mixing this material with natural rubber from the rubber tree or from the guayule plant which the Bureau of Plant Industry and the Forest Service has been asked to develop in this country, we can extend or enlarge the amount of commercial rubber that can be produced from natural rubber. We'll soon be in pilot-plant production of this new rubber extender which can be made from one of our widely produced farm crops. With the rubber situation as it is, it seems to me that we should encourage the development of rubber trees in South and Central America, the development of the guayule plant in this country, as well as the development of synthetic rubber and rubber extenders. After these sources have been developed industry will select the ones that are the most economically practicable for commercial production. And we should push all of these projects as fast as possible in the hope of soon finding something that will prevent the civilian population from having to do without rubber.

Reclaim Solvents Production Increased

HERCULES POWDER CO., Wilmington, Del., is building a new unit at its Brunswick, Ga., plant for manufacturing Tarol and Solvenol. These rubber solvents and plasticizers, recently improved through extensive laboratory and mill tests, are derivatives of the oleoresinous material of southern pine trees. "Tarol" is reported to supply the strong solvent and plasticizing action required in reclaiming, and its increased production is intended to assist in meeting the heavy current demand for reclaiming agents. Hercules equipment used in the manufacture of other naval stores materials is also being converted to make these rubber reclaiming materials.

Vulcanizer Paint Prevents Corrosion

BONNEJOHN vulcanizer interior paint reportedly is composed of materials so combined as to impart anti-corrosive properties under high steam pressures as an aid to prevention of explosions such as have sometimes occurred as a result of rust corroded surfaces inside vulcanizers. The paint, applied with a brush, spreads easily. No preliminary preparation is necessary other than having the interior surfaces and fittings reasonably clean. It is claimed that the paint has good adhesive qualities and will not peel, crack, or blister. The manufacturer also recommends it for carts, hangers, inside vulcanizer-door mechanisms, gaskets, exhaust sewerage pipes, and other fittings subjected to oxidation. Belke Mfg. Co.

Substitute Solvent for Toluol Announced by Neville

NOTOL No. 1 is a hydrocarbon solvent, high in aromatics, recently introduced by the Neville Co., Pittsburgh, Pa., as a substitute for toluol in the preparation of nitrocellulose lacquers. Its nitrocellulose tolerance is within 80% of that of toluol which permits its use as a substitute for that diluent with only a slight change in formulation. No changes are required in formulations in which hydrogenated light naphthas are employed. In such formulations, it is claimed, the faster evaporation of Notol No. 1 will insure more rapid drying of the resultant lacquer. The A.P.I. gravity of Notol No. 1 is 39-41° F., and its specific gravity at 15.6° C. is .8203-.8299. The initial boiling point is 177° to 182° F., and the Kauri-Butanol value, 75-78. Its color is water white.

Quebec Meeting Off

The Quebec Rubber & Plastics Group cancelled its March 6 meeting because of the inability of the speaker to appear that night.

Crash-Proof Fuel Tanks Described at SAE Meeting

TEN technical papers covering recent aircraft engineering developments were presented by eminent aeronautical engineers at the National Aeronautic Meeting of the Society of Automotive Engineers at the Hotel New Yorker, New York, N. Y., March 12 and 13. Three hundred aviation representatives attended the meeting.

W. H. Hunter, manager of deicer development and research for The B. F. Goodrich Co., discussed airplane deicing methods and equipment and presented 50 charts and diagrams to illustrate some new techniques. Recent improvements in deicing equipment are expected to make ice removal much easier at the high altitudes now being reached by newest military planes than at lower levels previously regarded as standard.

J. W. Baird, of the Civil Aeronautics Administration, addressed the meeting on "Crash-Proof Fuel Tanks." He outlined the various stages of development during the 1914-18 war which culminated in the present-day bullet-proof and self-sealing tanks. A survey of the causes and effects of crashes and the origin of fires resulting therefrom was followed by an outline of the principles involved in crash-proof fuel tank construction. Modern self-sealing tanks were said to consist of a thin inner layer of gasoline resistant synthetic rubber surrounded by a thick layer of sealant such as pure gum rubber, encased by a tough elastic outside cover of vulcanized rubber or leather which acts as a compression member for the sealant. Usually a compressed fiber or metal outside cover is added to give strength. The weight, bulk, and cost of such tanks precludes their application to civil aircraft. Several manufacturers, Mr. Baird said, were developing crash-proof types which will compare in weight with metallic tanks. He concluded his address with a discussion of provisions for protection of other parts of aircraft fuel systems.

UNITED STATES

Synthetic Rubber Patents License-Free, Production Upped; Reclaim Rationed; Specifications for Rubber Goods Revised; Ceilings Set on Used Tires and Rubber Footwear

As a result of an anti-trust action (see below) certain synthetic rubber patent rights have been suspended, and the patents will be licensed royalty free for the duration of the emergency.

Jesse Jones in his recent report to the President (see page 62) sets synthetic rubber production at the end of 1943 at 700,000 tons, to cost $600,000,000. But Leon Henderson, appearing before the Senate committee investigating national defense, painted a gloomy picture of rubber needs and prospective supplies. (See page 45).

As long expected, sale and consumption of scrap and reclaimed rubber were rationed in Amendment No. 6 to Supplementary Order No. M-15-b. (See pages 52, 63).

Amendment No. 5 (see pages 51, 63) to the same order revises permitted uses of crude rubber and latex.

To protect the public against exorbitant prices the OPA set maximum prices on waterproof rubber footwear (see pages 46, 65) and on used tires and tubes (page 65).

Stocks of chlorinated rubber have been frozen (page 64); and the production and delivery of tire retreading and recapping equipment have been suspended except under certain conditions (pages, 37, 64).

For the first time recapped passenger-car tires are available under rationing regulations to certain civilians. (See page 65).

Following the above-mentioned reclaim order the government is expected to intensify its scrap rubber collection campaign, which is believed will be pushed more vigorously than the aluminum, waste paper, or junk campaigns were. It is further believed that it will be three months before the government will be able to tell what the scrap rubber supply will be.

CALENDAR

Apr. 7.	Los Angeles Rubber Group.
Apr. 9-10.	Midwest Power Conference. Palmer House, Chicago, Ill.
Apr. 10.	Boston Rubber Group. University Club.
Apr. 14-17.	Packaging Exposition and Conference. Hotel Astor, New York, N. Y.
Apr. 20-21.	Industrial Accident Prevention Assns. Convention. Royal York Hotel, Toronto, Ont., Canada.
Apr. 20-24.	A. C. S. 103rd Meeting. Memphis, Tenn.
Apr. 30.	Buffalo Rubber Group and Canadian Groups. General Brock Hotel, Niagara Falls, Ont., Canada.
May 2.	Chicago Rubber Group. Congress Hotel.
May 7-8.	Association of American Battery Manufacturers, Inc. Spring Meeting. Netherland Plaza Hotel, Cincinnati, O.
May 25-28.	National Association of Purchasing Agents. 27th Annual Convention and Inform-a-Show. Hotel Waldorf-Astoria, New York, N. Y.
June 1-2.	Canadian Chemical Association. Convention, Hamilton, Ont.
June 8-11.	A.S.M.E. Semi-Annual Meeting. Cleveland, O.
June 22-26.	A.S.T.M. Chalfonte-Haddon Hall, Atlantic City, N. J.

Synthetic Rubber Patents Freed in Anti-Trust Action

The Department of Justice on March 25 announced the filing of a consent decree in the Federal Court at Newark, N. J., which provides for the free public licensing for the duration of the war of all synthetic rubber and gasoline patents owned by the Standard Oil Co. of N. J. and its various subsidiaries. In the 66-page complaint the firm was alleged to have conspired with I. G. Farbenindustrie of Germany to restrain trade and commerce in the oil and chemical industries throughout the world. The complaint disclosed that Standard and I.G. in October, 1930, formed a corporation called Jasco (Joint American Study Co.) under the laws of Louisiana and specifically charged:

"The production of synthetic rubber was included within the combination and conspiracy alleged in this complaint. At the time of the formation of Jasco, the parties orally agreed that all processes for the manufacture and production of synthetic rubbers would be exploited jointly by both parties under the provisions of the Jasco agreement. Under the terms thereof, I. G. was to have control of such developments. Thereafter, I. G. developed two products, one made from butadiene and styrene called Buna S, which is especially used for the manufacture of tires, and the other made from butadiene and acrylo-nitrile, called Buna-N or Perbunan, which is useful for specialty purposes, and in particular where resistance to oil is necessary. By 1934, I. G. had fully developed both of these products and they were extensively used in Germany. So far as it is presently known, substantially all of the rubber requirements of Germany are supplied by I. G. by means of these processes. I. G., however, refused to transfer the patents and processes to Jasco."

The complaint stated that in the past ten years many American rubber and chemical manufacturers have asked I. G. or Standard for buna licenses. It claimed the two concerns, while encouraging such companies to believe licenses would soon be granted (as a means of discouraging such firms from undertaking independent research), at the same time endeavored to learn for the benefit of Standard and I. G. what progress was being made by the applicants in the research field.

"In 1938 Standard developed a new process of making synthetic rubber, called Butyl, by polymerizing isobutylene with a small percentage of butadiene or other diolefines. This process has the advantage of producing synthetic rubber which was by far the cheapest and which had certain properties which made it more desirable for certain purposes than either Buna S or Buna N, or other synthetic rubbers. Particularly for inner tubes and certain other purposes, Butyl has been found superior even to natural rubber. I. G. still refused to transfer its buna processes to Jasco or make available any information concerning them to Standard because, as Standard was informed, the Hitler government, for reasons of military expediency, refused to permit I. G. to do so, and, in the exercise of its control of the rubber field, I. G. refused to sanction any general program for the exploitation of synthetic rubber. Nevertheless, Standard decided that until this permission was granted, it would do nothing with regard to the exploitation of buna rubber and would make no move without the consent of I. G., although I. G. was in default under the terms of its undertaking with Standard by failure to acquaint Standard with the buna technique. Standard, nevertheless, decided to transmit samples and all information regarding Butyl rubber to I. G. Thereupon, I. G. informed Standard that it would attempt to secure the permission of the German government to transmit to Jasco information concerning the buna processes. I. G. never obtained such permission and, consequently, has never transmitted any information regarding the buna processes to Jasco, despite the fact that Standard has transmitted all information as to Butyl to I. G. until December, 1940."

The complaint further alleged that I. G., du Pont, and Standard agreed that they would sell no Buna N in price competition with neoprene, a du Pont product, and that, when and if, I. G. should consent to the exploitation of the buna processes in the United States, Standard and I. G. would consult du Pont before proceeding with such exploitation.

After the outbreak of war, the complaint continued, representatives of Standard and I. G. signed an agreement September 25, 1939, termed the Hague Memorandum, the purpose of which was


Use MORE
MICRONEX
Less RUBBER
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Beads or Compressed
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WITH reclaimed rubber comprising an important part of the rubber base of present day compounds, selection of the best black becomes more important than ever before.

With Standard Micronex more colloidal carbon and less rubber can be used. Lower proportions of rubber result in true conservation only when all around service is assured.

Micronex grades of finer particle size reinforce new rubber even more than does Standard Micronex. Similarly, the finer but harsher blacks accomplish the most complete reinforcement of reclaimed rubber. On the other hand, present day trends emphasize the importance of hysteresis effect. This is serious with the harsher blacks. With reclaim, in both tread and carcass, the essential balance of all vital properties is altogether necessary.

For this balance we suggest Standard Micronex.

•

Our Technical Service Department will be happy to consult as regards other Micronex types.

•

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to avoid having the Jasco patents, including the buna patents, seized by the countries with which Germany was at war.

The Hague Memorandum provided that I. G. was to have a continued interest in profits derived by Jasco from royalties under the synthetic rubber and other patents of Standard and I. G. pooled in Jasco, in the United States, the British, and French Empires. The relation of the two firms created by earlier agreements in November, 1929, remained such that I. G. could claim that it retained control over the buna patents, and I. G. was consulted by Standard in the exploitation of the process.

The complaint continued: "In or about November, 1939, defendant Standard notified companies engaged in the manufacture of tires and other rubber products that they had acquired complete control of the buna patents. Standard and I. G. had devised a plan to make sure they would have complete domination in the production and sale of synthetic rubbers. The plan provided for the formation of a single corporation, at least 51% of the stock of which was to be owned by Standard and the remainder by the leading tire manufacturers. Defendant Standard also was to receive thereunder a preferred right to supply all raw materials produced from petroleum and natural gas and required in the manufacture of synthetic rubbers. Each of the tire companies holding shares would be required to accept a license from the proposed company to manufacture for its own requirements, at a royalty rate of 7½¢ per pound, and to cross-license back to the proposed company all of its improvements in the manufacture of synthetic rubber. This program has not yet been put into effect. As a preliminary step, Standard offered to license the leading tire manufacturers under the buna patents at a royalty rate of 7½¢ per pound, and with a further condition that they were obligated to cross-license back to Development [Standard Oil Development Co.] all of their United States patents during the term of the agreement. The agreement also provided for Development an exclusive transferable right to grant licenses under foreign patent rights of the licensees for the same period. The proposed licenses further limited licensees to manufacture only for their own needs and prevented sale by them in bulk, and required that they sell at least 25% of their production, and all of their excess production, to Standard.

"Standard's purpose in requiring such restrictions and such cross-licensing was to assure for itself and I. G. continued dominance in the manufacture of synthetic rubber. Its purpose in requiring a royalty rate of 7½¢ per pound was to restrict rubber manufacturers to the manufacture of specialty rubbers and to prevent them from manufacturing rubber for tires. Because of vigorous objection by tire companies, Standard subsequently reduced the royalty rate, but still insisted upon the cross-licensing of all present and future developments of the process and its utilization. Up to and including January 1, 1941, the United States Rubber Co. and the Firestone Rubber Co. had accepted such licenses, but the other tire manufacturers refused to do so because of the requirements for cross-licensing and other stringent provisions.

"Despite the fact that Standard had transferred samples of Butyl rubber and complete technical information regarding it to I. G. in March, 1938, and at other times thereafter, Standard did not make available to any tire company any samples of Butyl rubber for testing purposes for tires and inner tubes until June, 1940, at which time it transmitted samples to the Firestone Rubber Co. and the United States Rubber Co., the two companies which have accepted licenses under the buna patents.

"Standard's scheme to achieve a monopoly in synthetic rubber was interrupted by the request of the United States Government that it enter into a pool with other rubber companies to license the buna patents in connection with the defense program, and on or about December 19, 1941, Standard, Firestone, Goodrich, Goodyear, and the United States Rubber Co. entered into a contract with the Rubber Reserve Co., a subsidiary of the Reconstruction Finance Corp., under the terms of which all the parties agreed to pool their patents of the buna type and issue licenses to any person at the request of the Rubber Reserve Co. Defendant Standard's Butyl patents were not included in such pool, and to date defendant Standard has not issued any license under such patents."

The consent decree signed by the defendants, who pleaded *nolo contendere*, also provides for compulsory royalty-free licensing of synthetic gasoline and numerous other chemical products manufactured from a petroleum base, and processes for the refining of petroleum. Complete know-how and technical information required for their use must be provided with the licensed patents. After the war the defendants are permitted to charge a reasonable royalty. The decree also enjoins the defendants from making any agreements with I. G. of which the Department of Justice is not given contemporaneous notice. Each of the ten defendants was fined $5,000.

Standard Oil Statement

A statement issued by Standard Oil Company of New Jersey on March 25 follows:

"The anti-trust case which was to have been brought by the Government against Standard Oil (N.J.) and various subsidiaries, as well as officers and directors, in the U. S. District Court of New Jersey, has been settled by the entry of a consent decree and the imposition of fines on pleas of *nolo contendere* to the Government's information."

"The controversy arose out of certain contracts made by the company and the I. G. Farbenindustrie, the chief chemical concern of Germany. Under these agreements, beginning in 1929, Standard acquired interests in certain I.G. patents and gave certain rights in inventions developed by Standard.

"As a result, Standard was able to bring to this country vital German discoveries in the field of petroleum and to develop their use in the United States. Many of these have proved of great military importance in the present emergency. Among these is the process for making synthetic toluol, the basic constituent of TNT. Another is the hydrogenation process by which the American air force was the first in the world to obtain 100-octane aviation fuel. More recently, and of greatest immediate importance in these developments, is the production from oil of synthetic rubber.

"The government contended that these contracts, and certain subordinate agreements and practices which have grown up under them, tended to restrain trade in violation of the Sherman Act. The company disagrees with this contention. The developments made under these agreements have advanced the progress of American industry and its ability to meet the war emergency. Nevertheless, the company realizes that to obtain a vindication by trying the issues in the courts would involve months of time and energy of most of its officers and many of its employes. Its war work is more important than court vindication. Nor has the company any desire to remain in a position which the Department of Justice considers in any way questionable.

"Therefore, to bring the matter to a conclusion the company has agreed to the consent decree and the entry of pleas of *nolo contendere*. Under the terms of the decree, existing contracts between Standard and I.G. are abolished and the company agrees to grant royalty-free licenses during the emergency under all existing patents covered by the contracts.

"As a result of the declaration of war with Germany, the interests of I.G. in these contracts and patents are in the hands of the Alien Property Custodian, who is responsible for the protection of all foreign enemy interests in the United States. As the representative of the I.G. interests involved, he has consented to the entry of the decree."

Office of Defense Transportation, Washington, D. C., has named as one of eight consultants to advise Philip A. Hollar, acting director of the Section of Materials and Equipment, on technical matters pertaining to materials and equipment for various branches of the transportation industry, A. L. Viles, president of The Rubber Manufacturers Association, Inc., New York, N. Y., who will act on rubber products, including tires, tubes, insulated wire, and belting and other mechanical goods.

The ODT on March 12 announced that advice and assistance will be given local business enterprises seeking to readjust local delivery services as a means of conserving trucks, tires, and other equipment and materials. Those interested should communicate with John L. Rogers, Director, Division of Motor Transport, Office of Defense Transportation, Washington, D. C.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has been awarded a contract by the War Department for design, engineering, construction, personnel training, and operation of a manufacturing plant in Tennessee, under the supervision of the Memphis District Office of the Corps of Engineers. Operation of the plant will cost more than $5,000,000.

Synthetic Rubber Output to Be Stepped up to 700,000 Tons Yearly

According to Jesse Jones, chairman of the Reconstruction Finance Corp., Washington, D. C., synthetic rubber production in this country is to be increased to 700,000 tons a year by the end of 1943. Excerpts of Mr. Jones' report to the President and the Congress of the United States on March 21 follow:

As of March 7, 1942, the Reconstruction Finance Corp. and its subsidiaries, including the Export-Import Bank, had authorized loans and commitments aggregating $11,494,438,962 in connection with the war.

Under authority granted it June 25, 1940, as amended, the RFC has created, and owns all of the capital stock of Rubber Reserve Co., Metals Reserve Co., Defense Plant Corp., Defense Supplies Corp., and War Insurance Corp. These companies are all owned, managed, and operated by RFC directors and personnel, under my supervision. They act as service agencies in the war program. When the President, the War Production Board, the Army, the Navy, the Maritime Commission, or the Board of Economic Warfare establishes the need for plant facilities, materials or supplies, for which no other provision is made, the RFC, when requested to do so, undertakes to provide them. In this way it serves those responsible for war production policies. It does not make policy.

The commitments have been made by:

Defense Plant Corp.	$4,797,757,903
Defense Supplies Corp.	1,749,521,213
Metals Reserve Co.	2,215,818,000
Rubber Reserve Co.	875,000,000
War Insurance Corp.	100,000,000
RFC loans direct	1,259,865,964
Export-Import Bank	496,475,882
Total	$11,494,438,962

Defense Supplies Corp. has agreed to purchase excess inventories of new tires and tubes for passenger automobiles, frozen under the rationing order of the Office of Price Administration, from dealers, jobbers, distributers, and manufacturers. It is estimated that of the 7,500,000 tires and tubes in the hands of manufacturers and dealers, the Corporation will purchase up to 5,000,000 in this transaction, representing a total commitment of $75,000,000. These tires and tubes will be marketed through the regular channels of distribution under the rationing program.

Under Congressional authority granted for the first time on June 25, 1940, and at the request of the President, Rubber Reserve Co. entered into an agreement on June 29, 1940, with the International Rubber Regulation Committee (which committee controls over 97% of the world's output of crude rubber) to purchase a reserve supply of crude rubber. It increased the agreement from time to time, buying all the rubber produced which could be exported to the United States that was not bought by the rubber industry in the United States. We were continually urging them to produce more rubber. In addition the Company agreed to buy all available rubber produced in Brazil. The amount actually received and in transit to the United States is approximately 673,000 tons purchased at a cost of approximately $292,000,000. This includes 90,503 tons of so-called barter rubber which Rubber Reserve Co. took over from Commodity Credit Corp. Rubber Reserve Co. has agreed to pay Commodity Credit Corp. approximately $45,500,000 for this rubber.

We have a much better stockpile of rubber now than we have had at any time, but due to the fact that we have to consider the problem of supplying the other United Nations and are using more rubber for military purposes than was ever contemplated, a very strict rationing of rubber is now necessary.

The subject of synthetic rubber was discussed by representatives of the National Defense Council in the Fall of 1940. Mr. Stettinius advised the building of plants sufficient to manufacture 100,000 tons of synthetic rubber a year. I discussed the matter with the President, and he approved the expenditure of up to $25,000,000 for this purpose.

We started negotiations with some of the rubber manufacturing companies and oil companies for the production of synthetic rubber. The patents were not generally available to all the companies, and the rubber industry as a whole insisted upon having a part in any synthetic rubber program undertaken by the government.

Neither the rubber companies nor the oil companies owning the patents were willing to spend any of their own money in manufacturing synthetic rubber, notwithstanding that the rubber manufacturing industry, the oil industry, and the automobile industry are all dependent upon rubber tires for their profits.

In my testimony before the Senate Banking and Currency Committee, May 8, 1941, I stated, "It would seem we have rubber enough to run for at least 1½ years if we were cut off tomorrow from a supply of natural rubber and we could build synthetic rubber plants within that time. Estimates brought to me indicate that we could run for 2½ years, but I have cut that time down to 1½ years, and that would give us about the time required to build synthetic rubber plants."

The problem of synthetic rubber was generally discussed in the Committee, and it was the consensus that limited operations should be undertaken. The President concurred in this course.

On May 16, 1941, we concluded agreements with some of the leading producers of rubber, chemicals, and oil products for the construction and operation of plants for the manufacture of synthetic rubber sufficient to increase the total annual capacity in the country to approximately 100,000 tons.

Immediately after Pearl Harbor, which no one had foreseen, with the approval of the President we started negotiations for the construction of facilities sufficient to increase our productive capacity of synthetic rubber to a minimum of 400,000 tons annually upon the thought that our source of supply from the Far East might be reduced by interrupted shipping conditions.

When the fall of Singapore threatened, another unexpected turn of events, we, at the request of WPB and with the approval of the President, authorized the construction of additional facilities sufficient to increase our production to a minimum of 700,000 tons annually, including what will be produced with privately owned facilities. RFC expenditure for these plants will be approximately $600,000,000.

If the construction materials are made available to the contractors, facilities for the manufacture of 90,000 tons per year should be completed in 1942, 250,000 tons by June 1943, and the entire amount by the end of 1943.

Dr. Brandes Discusses Hemisphere Rubber

Dr. E. W. Brandes, rubber expert of the Bureau of Plant Industry, Department of Agriculture, recently testified before the House Appropriation Committee, during hearings of the Department's 1943 appropriation bill. A brief summary of Dr. Brandes' remarks follow.

The wild rubber from Central and South America does constitute a considerable reserve of rubber. It was possible for us to make an investigation to some extent of these possibilities during the last 19 months, and it is our feeling that perhaps up to 70,000 tons of rubber could be produced by careful and proper financing and by the expenditure of a good deal of effort. It would require perhaps 18 or 20 months to increase production to 70,000 tons per annum. The price, however, would be considerably higher than the present New York prices.

Leaf disease is not a factor in the case of wild trees, and it was only so when attempts were made to cultivate the trees in plantations. Under such conditions the trees are brought together, an ideal condition for the spread of this leaf blight. Hope for plantations is now based on disease-resistant strains.

A project conducted by the Office of the Coordinator of Latin American Affairs, but apart from the project in the Bureau of Plant Industry, is concerned with a further study of the possibility of rapidly increasing the gathering of wild rubber. The leader of that project is working very closely with the Bureau so that its work can be integrated with the Bureau's work in the development of plantation rubber.

Synthetic rubber is definitely one of the sources of rubber that will have to be turned to, but for most purposes synthetic rubber has to be mixed or blended with natural rubber to make a real usable product, and that is why it is extremely important to develop the natural rubbers as well. Up to the time that Germany invaded Russia the Germans obtained their natural rubber to mix with synthetic from Japan through Russia. The best tire would be made of crude rubber, but for certain purposes synthetic could be used up to 50 or 60, or even 70% in the mixture.

From goldenrod leaf we can obtain 100 to 300 pounds of rubber per acre, but the development has not been carried far enough to produce tires to see how they wear, and no factories exist at this time for extracting the rubber. The operation of the only factory in the United States that makes rubber from cultivated guayule has been rather intermittent, with production this year in a short run only about 500 tons.

Scrap and Reclaim Rationed; Rubber Goods Specifications Revised; Other WPB Orders

In consequence of a serious shortage of scrap rubber, strict controls on the use and sale of scrap and reclaimed rubber were released March 20 by the War Production Board in Amendment No. 6 to Supplementary Order No. M-15-b (see page 52).

The Rubber Branch of WPB emphasized that if scrap rubber is not returned to reclaimers in adequate quantities, this country's reclaim capacity of about 350,000 short tons a year, all of which is needed for war or essential civilian purposes, cannot be kept running at a peak level.

After March 31 the use of reclaimed rubber is banned except for these purposes:

1. To manufacture any of the products for which crude rubber or latex is permitted, provided that reclaimed rubber may not be used to fill war orders until a report has been forwarded to the WPB Rubber Branch. 2. To manufacture a specific list of products, known as List E, the amounts so used to be determined by a specific formula. 3. For the month of April only, to manufacture another specific list of products, known as List F. After April 30 specific allotments of reclaimed rubber will be made from time to time to manufacturers of products on this list.

Appeals will be entertained by the Rubber Branch for products not listed. Appeals, however, will not be considered for the following items, the Branch announced:

Advertising novelties; hair pins and hair curlers; ash trays; baby-carriage tires; dress shields; household gloves; lamp shades; millinery; steering wheels; teething rings; typewriter keys; arm rests; artificial flowers; artificial leather; aprons, mats, mud flaps, and running boards for passenger automobiles and buses, trucks and tractors; bags, packages, and containers except as adhesives or sealing compounds; bath caps, sprays, sponges, mats; pillows; soap dishes; blackout paint (except shatterproofing materials); buttons; blow-out patches, boots, and reliners made from scrap; carpet cushion; chair cushions; upholstery and mattresses; chair and furniture parts, including casters and caster cups; coasters; coin mats; contraction joint seals and concrete filler; cosmetic applicators; croquet balls; desk sets; dish drainers; door and window wedges, checks and bumpers; electric base plugs; flooring, tile and tiling and wainscoting (except conductive); finger pads; fly paper; fly swatters; foot bath trays; gambling and coin-operated amusement devices; gasoline curb pump hose; golf bags, driving mats, and tees; handle grips (except for dielectric purposes); ink wells and bottles; jar openers; kneeling pads; lawn mower tires; mats and matting (except switchboard and conductive); molds for casting; mud flaps, pacifiers; pedal rubbers; paint brush guards; pencil plugs; cigar and cigarette holders; plate wipers; poker chips; quoits; serving trays; sink pads, mats, and drain stoppers; sponge applicators; stair and step treads; swimming tubes and water rings; table tops; telephone bases; thermoplastic coatings; toilet seats; toys and parts of toys (except as elsewhere permitted); typewriter and office machinery silencers; wallpaper cleaners; desk and chair protective pads; and Christmas tree ornaments and accessories including wire.

Besides, the order contains a general ban on the destruction of certain rubber products except where essential to manufacturing or reclaiming operations. Rubber Branch officials pointed out that there is a substantial loss of reclaimable rubber in the destruction of worn-out tires, casings, tubes, waterproof footwear, heels, storage battery boxes, and similar products. Many of these are normally cut up and sold for non-essential purposes, and many are burned around orange and citrus groves to prevent destruction by frost on tree buds. Other substances can be used for these purposes without wasting scrap rubber.

Officials estimated that this country's reclaiming capacity is about 350,000 short tons annually. It was pointed out, however, that this supply of reclaimed rubber—upon which demand has been exceedingly heavy as a result of the restrictions on crude——is completely dependent upon the supply of scrap rubber. Collections recently have fallen off sharply, since most persons have hesitated to give up worn tires which in former years constituted the main source of scrap. Since Pearl Harbor, receipts of scrap at reclaiming plants have been less than one-half of the normal rate.

Amendment 6 also prevents the acquiring of excessive inventories by users of reclaimed or scrap rubber by banning the purchase or acceptance of delivery of a greater quantity than necessary for a minimum working inventory, taking into consideration restrictions on production contained in the order. Furthermore inventories of crude rubber or latex in excess of 60 days' needs will be deemed in excess of a practical working inventory, unless specifically authorized by the Division of Industry Operations or the Rubber Reserve Co. Inventories of reclaimed or scrap of such a size are also deemed in excess of a minimum inventory, except in the hands of reclaimers.

The necessity for channeling every available pound of reclaimable rubber into essential products arises from the fact that there is a serious question of whether there will be enough scrap to keep reclaiming plants at capacity. The permitted list of uses will exhaust the capacity of the industry, the Rubber Branch said.

Reclaimed rubber is still available for the manufacture of rubber heels, the Rubber Branch pointed out March 13. A recent report that the WPB had banned production of rubber heels caused a run on dealers' and suppliers' stocks, the Branch added. The only ban is on the use of crude rubber for making heels. Reclaimed rubber has been so used for some time.

New Specifications on Rubber Products

The War Production Board has added several groups of products to its lists of permitted uses of crude rubber and latex, but at the same time has ordered general reductions in the amounts of both rubber and latex allowed for specific articles. Amendment No. 5 to Supplementary Order M-15-b (see page 51), announced March 3 by Director of Industry Operations James S. Knowlson, substitutes four new lists of permitted products and uses, effective March 1.

The original order, issued January 23, 1942, gave two lists of products for which rubber and latex could be used only up to certain percentages of the average monthly consumption during the year ended March 31, 1941, except to fill strictly-war orders. Two additional lists enumerated products for which manufacturers desiring to use crude rubber or latex had to secure the specific permission of the WPB.

The new List "A"—products for which crude rubber may be used to certain percentages — now contains 31 groups, compared with an original list of 19. List "B"—products for which manufacturers must have specific permission—now includes 10 groups, compared with five. Lists "C" and "D"—products for which latex is used—now total eight groupings, compared with six in the original order.

Despite the addition of several articles and the shifting of some into groups for which a higher rate of consumption is permitted, total rubber consumption under the new lists is expected to be somewhat smaller than under the original order, according to the WPB Rubber Branch.

Most of the additions included on the new lists were allowed during February on special appeal from manufacturers, and all of the newly permitted articles are considered necessary to keep essential industries operating. Examples of increases in permitted consumption rates are rubber-lined tanks, pipes, and fittings, which may now use rubber at a rate of 140%, against 100% under the previous order; and electricians' gloves, 200%, against 100%.

Among reductions are fire and mill hose, from 180% to 40%; suction and welding hose, from 140 to 100%; and conveyer belts, from 140 to 125%.

An addition to List "B"—products for which permission to use crude rubber must be secured—is thread for industrial shoes, sanitary belts, and surgical supports. Corsets, brassieres, and foundation garments are still excluded from the crude rubber and latex lists. Also on List "B" are rubber fabrics for police and fire clothing, formerly on List "A" of the original order at a 60% rate, and camelback for retreading.

Technical changes in rubber Order No. M-15-b-1 and the addition of two new specifications lists were announced March 25. (See pages 49-50.) The order is designed to conserve crude rubber, latex, and reclaimed rubber by establishing specifications which limit the rubber content of specific products.

Amendment No. 1 alters the terminology of the list governing the manufacture of waterproof boots, pacs, arctics, gaiters, and overshoes, but does not change the rubber content for these articles. The list covering tire tubes, casings, etc., has been revised to provide a higher crude-rubber content tread stock for certain types of truck tires, putting the tread stock for civilian and military truck tires on the same basis. The new list also provides for the manufacture of certain sizes of capping stock and camelback not previously permitted.

The Rubber and Rubber Products

Branch explained that the total amount of rubber which may be used in a given tire may be distributed between tread and friction by individual manufacturers on a basis which they consider provides the best quality tire with the given amount of rubber.

One of the new sets of specifications in Amendment No. 1 covers truck tire flaps. These specifications set a maximum for each of the various sizes and types of tire flaps and are expected to save about 500 tons of crude rubber a year.

Another new set of specifications is established by Amendment No. 2, covering insulated wire and cable. These changes are expected to result in an annual saving of about 3,750 tons of crude rubber, or 37½% of normal consumption.

Chlorinated Rubber Stocks Frozen

All stocks of chlorinated rubber in the United States, except those going into specified uses, were ordered frozen February 23 by J. S. Knowlson, Director of Industry Operations, preparatory to requisitioning by the War Production Board or diversion into war production.

Amendment 1 to General Preference Order No. M-46 to Conserve the Supply and Direct the Distribution of Chlorinated Rubber provides that chlorinated rubber may be used only for these purposes: as a paint for interior use in industrial plants where resistance to chemical corrosion is necessary, as a paint in arsenals, and for painting ship bottoms and other submarine uses; for flame-proofing military fabrics, including tents; for tracer bullets; for adhering rubber articles to metal; for electrical insulation.

Stocks on hand for all other uses must have been reported at once to the Chemicals Branch, WPB, and held for later disposition.

While facilities for the production of chlorinated rubber are being increased greatly, current military demands are greatly in excess of supply. The material has been under a monthly allocation system since November 1, 1942, and none is now going for non-military use.

Principal civilian uses for chlorinated rubber now prohibited are: swimming pool paint and other concrete and masonry paint; treatment of fabrics, papers, and printing inks for greaseproofing and to increase resistance to chemical action; bottle-cap closures; fast-drying paint finishes.

For Greater War Effort

American industry was ordered on March 11 to begin sending the WPB a month by month report on its conversion to war work.

Donald Nelson WPB chairman, on March 3 signed Directive No. 2 broadening procurement policies to insure the widest possible placement of war supply contracts and a much greater utilization of small plants and factories in order to increase immediately output of war goods. Provisions cover four points. (1) All military supply contracts are to be placed by negotiation instead of competitive bidding, unless the Director of Purchases indicates the contrary. (2) In placing contracts primary emphasis is on speed of delivery. (3) Contracts for standard and semi-standard articles relatively simple to make should go to smaller concerns so that facilities of larger, more fully equipped firms may be available for more complicated items. (4) Subject to these considerations, contracts are to be placed with companies needing the least amount of new machinery and equipment.

George C. Brainard, chief of the Tools Branch, on March 6 requested owners of idle machine tools to make them available for sale so that they can be placed in plants engaged in war production. Complete details, including a picture or cut of the machine, where possible, should be sent to the Available Tools Section, Tools Branch, War Production Board, Social Security Bldg., Washington, D. C.

Other Orders

Limitation Order L-61, March 11, (see page 37), suspends production and delivery of tire retreading and recapping equipment except on preference-rated orders in order to prevent duplication of facilities and a consequent waste of critical materials. This order formalizes and makes more definite a directive issued January 28 prohibiting manufacturers of such machinery from filling any orders except those supported by preference rating certificates.

Supplementary Limitation Order No. L-26-a (March 9, 1942) Restricting the Manufacture of Farm Tractors Requiring Rubber Tires, bans such production after May 1 and rigidly curtails output in the interim. Thus March production, requiring about 300 tons of crude rubber, was set at 10,000 tractors (against 17,800 planned by manufacturers, the average of January and February) and April output, 8,000, with 240 tons of crude. Manufacturers thus must change swiftly from the use of rubber tires to steel-wheel equipment.

Limitation Order L-52, March 12, 1942, curtails the manufacture of bicycles to save critical war materials. The order will result in the production of two so-called Victory models, one for men and one for women, and they will be stripped of all non-essential gadgets and bright work. No juvenile models will be made. Tire tubes and casings are subject to the limitations of the rubber conservation order No. M-15-b-1 under which the use of crude or raw rubber in a bicycle tire is limited to 7½ ounces. No tire or tube may have a greater diameter than 1.375 inches; thus balloon tires are eliminated, but standard-size bicycle tires are permitted.

Supplementary Limitation Order L-44-a Further Restricting and Finally Prohibiting the Production of Radio Receivers and Phonographs (March 7) bans the manufacture of such goods for civilian use after April 22, 1942.

Extension No. 4 (March 6, 1942) to Limited Preference Rating No. P-54 as Amended, extends from February 28 to April 30 the A-3 Preference Rating available for deliveries of materials for the manufacture of truck trailers, and buses, medium and heavy motor truck bodies and cabs.

Supplementary General Limitation Order L-5-C Further Restricting and Finally Prohibiting the Production of Domestic Mechanical Refrigerators, February 23, 1942, discontinues production of these refrigerators after April 30, 1942, so that the entire industry can be converted to the production of war materials.

Limitation Order No. L-53 to Direct the Distribution of Track-Laying Tractors and Auxiliary Equipment, prohibits, effective February 19, 1942, the sale or delivery of unused track-laying tractors and certain auxiliary equipment in the possession of manufacturers, distributers, and dealers.

Products Now Using Reclaim

Manufacturers of athletic equipment for which crude rubber or latex is no longer available are experimenting with reclaimed rubber. Several tennis ball makers have developed an all-reclaimed ball, which, though not so lively as a ball made with new rubber, would be fully serviceable to the average player. The reclaimed balls can last as long as ordinary ones since wearing quality depends almost entirely on the felt.

The WPB Rubber Branch also reports that progress has been made in developing an all-reclaimed rubber core for baseballs, and with squash balls using reclaimed. No solution has yet been found to the golf ball problem.

The Board of Economic Warfare, Office of Export Control, Washington, D. C., has announced that beginning February 28, 1942, certain electrical machinery and apparatus and rubber tires, tubes, and tire sundries and repair materials will no longer be authorized to be exported to any British Empire destination under the unlimited licenses held by the British Purchasing Commission. Shipments of tires, tubes, etc., will be made to parts of the Empire in special cases where the embargo has been relaxed and individual shipments are authorized.

"Current Controls Bulletin No. 9", March 3, 1942, of the Board of Economic Warfare, explains how export control procedures are now greatly simplified as a result of a recent agreement between the United States and Great Britain. Products covered include carbon black, certain chemicals, fire control instruments, gages, gears, measuring and scientific instruments, rubber and rubber manufactures including natural and synthetic rubber, titanium and titanium salts and compounds, and zinc. "Current Controls Bulletin No. 10", March 5, explains in detail the procedure to be followed in applying for license to export rubber and rubber goods.

Maximum Prices Set on Waterproof Rubber Footwear and Used Tires; Other OPA News

Maximum manufacturers' prices for waterproof rubber footwear have been established as a result of individual agreements negotiated between the Office of Price Administration and manufacturers at a recent meeting in Washington, Price Administrator Leon Henderson announced March 11. The agreements established prices in no case higher than those in effect December 3, 1941, when Mr. Henderson requested manufacturers not to effect price increases. Prices on a substantial number of items are lower than the December 3 level. These price decreases reflect the reduction in crude rubber content ordered by the War Production Board to conserve the rubber supply. The agreements also provide that all discount schedules in effect December 3 be retained. OPA officials pointed out that the agreements establish maximum prices only and that firms may sell at less than these levels.

These are the first agreements of this kind negotiated by Mr. Henderson under the power granted him in the Emergency Price Control Act of 1942, which permits the Administrator to negotiate agreements for the stabilization of prices directly with manufacturers. This method is reported to have been especially useful in the case of waterproof rubber footwear, as manufacturers had never before produced items exactly comparable to the new "Victory Line" of boots, arctics, and rubbers.

Price Ceilings on Used Tires and Tubes

Maximum Price Regulation No. 107—Used Tires and Tubes—sets maximum prices at which second-hand passenger-car and truck tires and tubes may be sold after March 16, 1942. The regulation, adopted because of widespread complaints of profiteering, used as a guide prices existing between October 1 and 15, 1941. Used tires and tubes have not been rationed as yet.

To determine price ceilings used tires are divided into four categories: *Passenger car*: first category, tires that retain 7/32-inch or more of tread design depth; second, more than 3/32-inch, but less than 7/32; third, all regrooved tires and tubes or those that retain 3/32-inch or less of tread design depth; fourth, worn smooth and usable as basic carcasses for retreading or recapping. *Truck tires*: first category, 9/32-inch or more of tread design depth; second, more than 4/32-inch, but less than 9/32; third, 4/32-inch or less; fourth, worn smooth and usable as basic carcass for retreading or recapping.

Comparative maximum prices of a 6.00-16 four-ply passenger-car follow: new (as per Price Schedule No. 63), $14.75; used, first category, $8.10; second, $6.65; third, $4.45; fourth, $1.50. Respective maximum prices for an 8.25-15 ten-ply truck tire are: $68.50; $37.70; $30.85; $20.55; and $7.20. Maximum price for used passenger-car tubes is $1.50 for all sizes, and for truck tubes, $2 to $14, depending on size.

To make the maximum prices for basic tire carcasses in the retread schedule conform to those in the used tire and tube regulation, Amendment No. 1 to Revised Price Schedule No. 66—Retreaded and Recapped Rubber Tires, and Retreading and Recapping of Rubber Tires, and Basic Tire Carcasses—was issued March 7 with Price Regulation No. 107 and involves changes only in respect to basic tire carcass maximum prices.

Camelback Survey and Allotments

To conserve rubber further by insuring maximum durability and service of tires now being recapped, the OPA will develop minimum standards for the grades of camelback now being made. Questionnaires have been sent to all manufacturers requesting information on the physical properties and composition of camelback which indicate its wearability and other quality factors. The questionnaire will provide data on the proportions of crude and reclaimed rubber and other important materials used in making camelback. Wherever it is found that inferior tire capping stock is being made, the Standards Section of the Consumer Division will assist manufacturers to bring their camelback up to minimum standards.

Provisions for an original allotment of 300 pounds of truck-type camelback to retreaders and recappers for certain small-gage truck-tire molds and additional allotments for multiple retreading or recapping machines appear in Amendment No. 2 to Revised Tire Rationing Regulations issued (March 16) and effective March 17. Thus each machine that can recap or retread two or more tires simultaneously will be allowed a maximum of 1,500 pounds of truck camelback instead of 750 pounds as originally provided. Even though a retreading establishment already has received authorization to purchase 750 pounds for each such machine, it may now be allowed an additional amount sufficient to raise its inventory as of February 19, 1942, to 1,500 pounds. The original allotment of only 750 pounds resulted in uneconomical operation of such multiple equipment.

Certain small truck-tire-size molds not originally provided for under the Revised Tire Rationing Regulations are now allotted 300 pounds of truck-type camelback. Each mold or curing table equipped with matrices capable of retreading or recapping truck tires 5.50-17 and 30x5 or larger, but which cannot handle sizes 7.50-20 or larger, is made eligible for an initial allotment of 300 pounds of truck camelback.

March and April Tire Quotas

March tire and tube quotas were substantially larger (see page 96) than those provided for rationing to eligible vehicles in February and applied to the 48 states, the District of Columbia, and U. S. territories: Alaska, Hawaii, Panama Canal Zone, Puerto Rico, and the Virgin Islands. The increase in March quotas is seasonal and reflects subsidence of severe winter weather that tends to make motor transportation difficult in many sections of the country.

No retreaded passenger car tires were available for rationing in March, since the War Production Board has not authorized the manufacture of passenger-car camelback during that month. Thus only new passenger-car tires and tubes were rationed during March, and their sale was restricted to vehicles on List A of the eligibility classifications. Hence, for another month no passenger car on List B of the eligibility classifications was able to get a retreaded tire.

State and national reserves were deducted from the published quotas for March in the same manner as in the two preceding months. The national reserve is, in effect, a pool that permits OPA to make adjustments between states and territories; while the state reserves are used for the same purpose among counties at the discretion of the state rationing administrators.

April quotas making a limited number of recapped tires available to war workers and other passenger-car owners on List B for the first time, were announced March 24. Also included are 470,317 recaps for passenger cars and motorcycles. No such tires or recapping jobs were available last month. The quota provides 101,636 new tires for passenger cars on List A and 285,977 new tubes for List A and B cars together, compared with 104,701 new tires and 87,635 new tubes in March, when no tubes were provided for List B passenger cars.

Truck tire quotas are somewhat larger than in March, again reflecting better weather. April quotas make 275,523 new tires and 260,983 tubes available for eligible trucks, buses, farm equipment, and industrial tractors, against 256,385 new tires and 288,149 new tubes in March. Recapped truck tires in the April quota total 246,442, against 110,225 last month.

New and recapped passenger-car and motorcycle tire quotas for April will permit replacements at less than one-fifth of the rate a year ago. Assuming that sales in April, 1941, were made to meet normal requirements in keeping 30,000,000 passenger cars in operation, the quota releases for this April are at a rate that, if continued, would keep in operation only a little more than 5,000,000 cars.

Total quotas of new and recapped truck tires for April are almost three-fourths as large as the total of new tire replacement shipments and recaps in the corresponding 1941 month.

The figures show a much higher ratio of recaps to new tires in April this year than last, a change brought about not only by the sharply increased amount of recapping under rationing, but also by the steep reduction in number of new tires made available. In the April quotas, for instance, approxi-

mately 4½ passenger car-recaps (470,-317) to every one new tire (101,636) are made available. In April, 1941, replacement shipments of new tires (2,-816,000) were almost seven times as great as sales of retreads (433,000). As to truck tire quotas, there is almost one recap (246,442) to every new tire (275,-523). In the 1941 month the ration was about one to six, (98,000, against 605,-000).

Later on new tire stocks may be released more rapidly in relation to the entire quota, as there is a limit to the number of times a casing may be recapped economically. It is indicated that passenger-car tires to sustain the nation's essential transportation must come more and more from new stocks on shelves and in storage as the tires now in service wear or are damaged beyond use as carcasses for recapping.

Total quotas of new tires released for passenger automobiles under OPA rationing in the first quarter of 1942 were almost 95 per cent below the total replacement shipments reported by the Rubber Manufacturers Association, Inc., in the corresponding period of 1941, that is, 333,040, against 6,352,927 tires. Reflecting the relatively greater importance of truck and bus transportation in the nation's economy, releases of new truck tire quotas in the first 1942 quarter were only a little more than 27% below total replacement shipments in the same period last year. The respective figures are 728,425 and 1,003,270. Besides the new truck tires released under quota in the first quarter, quotas for 350,249 truck retreads were issued. No comparison is available as there are no accurate data on the amount of retreading done in the initial three months of 1941. No quota allotments were made for passenger-car tire retreads in the first quarter this year.

Since it first began rationing tires and tubes January 5 the OPA gradually has been revising the basis on which quotas are allocated to counties. Surveys have been undertaken to enable the organization to anticipate local needs and set quotas accordingly.

Tire Return Plan

The "Tire Return Plan", worked out jointly by representative tire dealers, the OPA Industrial Council, the Defense Supplies Corp., and more than 50 tire and tube manufacturers, distributers, and mail-order houses, with the participation also of the Bureau of Internal Revenue and the Anti-Trust Division of the Department of Justice, announced February 27, provides means whereby dealers and jobbers can dispose of their stocks of new passenger-car tires and tubes to secure relief from the financial burden of carrying such stocks during a period in which they can make few sales under the tire rationing program. Dealers and jobbers can sell to the original manufacturers or mass distributers, who must buy such tires and tubes at the dealer's costs plus 10%. Manufacturers and mass distributers must sell such repurchased new passenger tires and tubes to the Defense Supplies Corp. as well as their own inventories of passenger-car tires and tubes except for small working stocks to fill orders in the near future. They will have the option of repurchasing tires from the Defense Supplies Corp. and must make such purchases from the corporation to fill lawful demands for tires from holders of rationing certificates. The Defense Supplies Corp. is prepared to handle as much as $75,000,000 worth of passenger-car tires and tubes under the plan, which will require a small upward revision of the ceiling prices now in effect on wholesale and retail sales of new passenger-car tires and tubes. Because truck tires and tubes are moving freely from dealers' shelves, they are not included in the plan, but permission has been granted dealers to sell truck tires and tubes back to manufacturers under terms of the rationing order.

Time within which tire dealers and jobbers must give notice of their intent to sell back new passenger-car tires and tubes was extended from March 15 to March 31 and the final date by which tires to be sold back must actually be shipped was extended from March 31 to April 15.

Legal Actions

A federal grand jury in Indianapolis, Ind., on February 14, in the first criminal action charging violation of OPA's rationing regulations, indicted the La-Salle Motor Sales Corp., Boonville, Ind., its president, Charles L. Hart, and its secretary-treasurer, Russell W. Baker, in less than a month after investigation of the case by OPA inspectors.

Federal District Judge L. B. Way, Norfolk, Va., on March 6, in the first civil suit against OPA, upheld the validity of the tire rationing regulations and issued a permanent injunction restraining delivery of passenger-car and truck tires without OPA authorization. Smith-Douglass Co., Inc., had filed suit to compel delivery by the Joynes Tire Co., of $1,427 worth of tires alleged to have been purchased last August. The temporary injunction had been issued by Judge Way on February 15.

The OPA, in its first such action, on March 14 suspended until June 30 all deliveries of new tires and tubes to Silverstein's Tire & Battery Service, Inc., and its president, George Silverstein, both of Albany, N. Y., found guilty of a wilful violation of the tire rationing orders.

In two replevin suits brought by Omaha, Neb., citizens to obtain possession of tires, Municipal Judge D. E. O'Brien ruled March 19 that when an OPA rationing order affects pending litigation, the rationing order will control his determination of the rights of the parties in the suit at issue.

Other Tire News

Government-owned vehicles, except military equipment and certain other exempt categories, will be classified as either eligible or ineligible to obtain new tires from government supplies by the Treasury Procurement Division under a program jointly announced by the OPA Administrator and the Director of the Procurement Division. Under the new plan eligible government-owned vehicles will not be able to obtain new tires without first making use of those tires belonging to other government vehicles not eligible under tire rationing regulations. It is also hoped that when the plan is fully developed, tires may be shifted from ineligible vehicles in one agency to eligibles in another and even that vehicles themselves may be turned from ineligible to eligible uses.

One feature of the program, effective immediately, is the creation of a "fleet-pool" of 2,000 new tires and 2,000 new inner tubes by the Treasury Procurement Division under authorization of OPA. This pool is intended to permit eligible government vehicles to replace blown tires, under emergency conditions, without any undue delay. These tires and tubes to be purchased by the Procurement Division will be deducted from the national reserve and thus will not affect the monthly state and county quotas.

Amendment No. 1 to the Revised Tire Rationing Regulations, announced February 21, but effective February 19, points out that although control exists over physical movement of new tires, there are no restrictions on mere physical movement of retreads where change in title or use is not involved.

Leon Henderson, OPA administrator, on February 27 declared that it is of absolutely no avail for a civilian consumer to apply to the War Production Board for a priority rating in the hope that it will enable him to purchase a new tire or tube.

Americans holding tires worn to the point where they are no longer usable can help relieve the rubber shortage situation by turning them in immediately to a scrap or junk dealer or a local collecting charity, Mr. Henderson advised on March 12.

Other Price Decisions

Manufacturers of rubber druggists' sundries were requested by letter March 16 not to advance prices above those in effect March 1, 1942, and were asked also to maintain all discounts, services, quality standards, and reasonable trade practices in effect March 1. Purpose of the request is to keep prices from mounting pending an investigation to determine proper maximum prices for rubber druggists' sundries. The letter stated also that, as a part of the price study, the OPA will ask companies in the near future to submit pertinent cost and earnings data. Manufacturers who intend any change in specifications or quality standards should communicate with the OPA before establishing prices on the altered articles.

The four major rubber companies have agreed to rescind price increases put into effect January 1, 1942, on tires sold as original equipment for automobiles and trucks of all types, and to rebate to customers the amount collected in excess of the December 31, 1941, level.

Army Conservation Growing

The War Department, Washington, D. C., recently announced that the Army has developed ways to conserve on more than 125 strategic raw materials. During the past year critical raw materials have been eliminated from many items of equipment, and the use of less critical substitutes is receiving constant study. Simplification programs and salvage operations have been accelerated. Besides at the Air Corps laboratory at Wright Field, Dayton, O., a new conservation section has been established.

The Medical Corps has eliminated rubber or reduced the raw rubber content in dozens of products, ranging from erasers on pencils to rubber basins, blankets, and mattresses. The Quartermaster Corps is successfully substituting reclaimed rubber or rubber substitutes in many goods and reducing the raw rubber content of others. Firemen's coats, raincoats, parkas, overshoes, and similar items are being made more economically.

The Quartermaster Corps has been conducting a large-scale study in cooperation with the WPB and The Rubber Manufacturers Association, Inc., revising specifications for soldiers' footgear to conserve rubber. Already notable savings have been made in making overshoes, rubber-top and knee-length boots, arctics, and ski-boots. It has been found that savings in rubber up to 50% can be effected on certain items by omitting or reducing the rubber content of certain Army "super-specifications"; in such cases the resulting quality ranks with certain "super-grade" types of civilian footwear. Rubber heels are also being eliminated from Army footgear wherever possible; otherwise the rubber content or the size of the heel is subject to reduction.

No More Rubber Raincoats For the Army

No rubber will be used in Army raincoats purchased from now on, the War Department announced March 13. As a substitute, all raincoat cloth will be coated with synthetic resins, somewhat similar to one used on a large scale in recent months for making shower curtains and women's raincoats.

Some months ago a study was initiated and an effort made to secure materials which would give a suitable raincoat without using rubber. Conferences were held with rubber manufacturers, chemical companies, textile concerns, and garment makers to determine what products were available in sufficient quantities to make high-quality raincoats. Special attention was given to various types of cloth to secure those fabrics having the best wearing qualities which could be manufactured on a large scale by readily available spinning facilities.

It is necessary that an Army raincoat be capable of withstanding extremes of weather conditions, ranging from below zero temperatures to above 100° F. The material must be able to stand flexing without the coating becoming separated from the fabric and still retain its waterproof qualities. The garment must have the necessary strength and durability to withstand severe military usage.

As a result of this research program, Quartermaster specifications have been prepared requiring that the fabric for all Army raincoats purchased in the future be coated with a synthetic resin compound. This rubber substitute, comparing favorably to rubber in its waterproof quality, can be prepared in sufficient quantities to meet the Army's immediate and future needs, according to the Quartermaster Corps technicians.

A recent large procurement of the new-type garments will save approximately a million pounds of rubber, according to the Quartermaster Corps.

Retreading Program

One-year contracts have been awarded to five retreading firms for recapping tires of Quartermaster Corps vehicles, following several months of negotiations and revision of original specifications. The primary contractors are: Auto Tire Co., Hartford, Conn., Modern Retreaders, Nashville, Tenn., Firestone Tire & Rubber Co., Akron, O., Schull & Phillips, San Antonio, Tex., and Strauss-Frank, Los Angeles, Calif. Army spokesmen believe the volume of retreading business will be so large that considerable sub-contracting will be necessary. Sub-contracting will also be desirable because of the transportation problem involved in shipping tires to and from primary retread shops.

All standard commercial highway tires used on QMC vehicles will be recapped by the primary contractors. All mud-and-snow design tires will be returned to the manufacturer for retreading, but all such tires to be recapped with standard retreads will be turned over to the primary shops.

QMC and Motor Transport Division spokesmen intimated that the Army has not entirely abandoned the idea of setting up its own retreading shops, but will give private industry a thorough chance to handle retreading operations before considering the base shop plan.

Senate Resolution 224, submitted by Mr. Gillette on February 17, provides for an investigation relative to the production of industrial alcohol, synthetic alcohol, and synthetic rubber from agricultural products.

President F. D. Roosevelt by letter on March 14 requested state governors to set maximum automobile speeds at 40 miles an hour in an effort to conserve rubber.

W. L. Batt, WPB director of materials, testifying March 24 before the Truman Committee investigating war production activities said that on September 12, 1940, the National Defense Advisory Committee advised prompt increase of synthetic rubber production to 100,000 tons annually. Such expansion was considered unnecessary by Jesse Jones, Federal Loan Administrator, and the plan was abandoned.

Our Washington Correspondent Says—

The problem of the first 200,000 tons of synthetic rubber has been licked, according to officials of the Materials Division of WPB. Procurement difficulties for the materials, including the chemicals necessary to butadiene production have been overcome. With construction priorities already cleared, the first 200,000-ton capacity will be in operation by the end of 1942, say Materials Division experts.

The next 200,000 tons of production is another story. It is this second program that government procurement specialists are working on now. The flow of materials for this second 200,000 tons of producing capacity is the particular problem. When this procurement flow is assured, another 200,000 tons can be estimated for the end of 1943. Materials officials expect to have this program completed in time.

The materials men of WPB even have a third program laid out—the third 200,000 tons. But some believe that this third program will not be needed—that 400,000 tons by the end of 1943 will do the trick, barring unforeseen emergencies.

Materials experts stress the point that materials procurement is the problem of synthetic rubber production, that plant construction is secondary. Before plants of 200,000-ton capacity go up, the materials for that capacity are lined up.

There is a definite move under way in Washington to turn the rubber problem, particularly the synthetic program, over to rubber experts. It is contended that the amateurs on the subject of rubber, but experts in political discussion have had the floor long enough. Batt's testimony before the Truman committee was indicative of the trend.

Observers of the synthetic rubber program on the War Production Board have a very simple explanation for Jesse Jones's optimism about our early attainment of 400,000 tons' production. Jones brushed aside urgings for all-out synthetic production two years ago, as contended by Batt before the Truman committee. Jones must now take a Pollyanna view of the situation in order to cover up his miscalculations. Fact-facing materials men say Jones has relied too long upon the magic of millions to accomplish all things. Synthetic production is a problem in the procurement of materials, and not primarily of financing.

WPB officials are also awaiting with considerable interest the report of Leon Henderson upon the Brazilian wild rubber situation before the Truman committee at hearings opening April 6, particularly since the Department of Agriculture survey mission is supposed to be doing a scientific job of surveying the same problem. WPB officials are interested in whether Henderson and the Department of Agriculture will turn in the same report or whether more conflicting statements are in prospect on the Brazilian situation.

EASTERN AND SOUTHERN

Scrap Movement Discussed at Dealers' Meeting

Several ways of increasing the flow of scrap to reclaiming plants were discussed by the Scrap Rubber Institute at a divisional meeting of the twenty-ninth annual convention of the National Association of Waste Materials Dealers at the Astor Hotel, New York, N. Y., March 18. Clarence H. Low, chairman of the New York Salvage Committee, announced that 3,000 tons of rubber heels and soles could be collected annually from the scrap piles of the 10,000 cobblers in New York. Julius Muehlstein, of H. Muehlstein & Co., Inc., New York, chairman of the meeting, stressing the necessity of keeping scrap dealers' stocks of tires and tubes moving to reclaimers, suggested complete turnover of inventories in 60 days. He also stated that there are from 28 to 32 million cars in the United States and that an inspection law to determine the quality and safety of tires would bring many tires and tubes to the reclaim stockpile.

B. F. Hollister, of the Rubber Branch, WPB, said that reclaimers will now take rubber heretofore rejected, regardless of price, and urged scrap dealers to save tire beads. A new rubber order, he announced, will soon be released containing a destruction clause which will make it illegal to burn or destroy rubber or any material containing rubber. Dealers were asked to report hoarders to the Bureau of Industrial Conservation, Rubber Branch, Building Temporary "E", Washington, D. C. Persons withholding scrap rubber from consuming channels may face government requisitioning of such stocks, it was said. Mr. Hollister also requested dealers first to supply reclaimers whose stocks were known to be low in order that capacity production may be maintained by reclaiming plants. He further stated that a National Salvage Campaign planned by the Bureau of Industrial Conservation is expected to increase materially the flow of scrap from homes throughout the country.

Further suggestions at the meeting included a redefinition of the word "consumer" as used in OPA Price Schedule No. 87 (Scrap Rubber) to include patch makers. Some part of the present scrap movement is to patch makers at prices in excess of the ceilings established in Schedule 87. But it was pointed out that patches are the only means of keeping many cars on the road and that more than 80% of such material ultimately is converted into reclaim.

Mr. Muehlstein was reelected president of the Institute. Alex Schulman, A. Schulman, Inc., Akron, O., was reelected vice president, and the other officers were also reelected for the current year. A motion was passed by the members to send letters to 10,000 small dealers designed to promote the collection of all kinds of scrap rubber. Mr. Muehlstein was also elected third vice president of the National Association of Waste Materials Dealers, head of which is David Feinburg, president of David Feinburg Co., Medford, Mass.

Addressing the annual banquet of that organization, Mr. Low asserted that if evidence of hoarding or large accumulations of scrap rubber is found, it may be necessary to obtain such scrap through government legal facilities as was done to obtain scrap metal from automobile graveyards.

The Franklin Institute, Philadelphia, Pa., has awarded a Certificate of Merit to Walter Larkin, senior inventor of the Fidelity Machine Co., Philadelphia, "in consideration of his admirable machine designing involving the ingenious application of known mechanical movements to the invention of circular knitting machines of special types." Included among his inventions are the triple-head weatherproof wire covering machine placing three reenforcement layers of cotton yarn on bare copper wire at a rate of speed five times greater than ever done before; and the reenforcement of rubber hose for the higher speed manufacture of windshield tubing and garden, radiator, and fuel line hose.

Rubber Playthings Scarce at American Toy Fair

The current shortages of rubber and other strategic materials were sharply reflected in the goods of the more than 400 exhibitors at the American Toy Fair held at the McAlpin Hotel and the Fifth Ave. Bldg., New York, N. Y., March 9 to 21. Buyers' orders were on a rationed basis, and many items were sold for delivery on an "if and when" contract to be determined by the availability of material. Goods with wheels were reportedly scarce. Substitution of non-critical materials was featured and some firms showed toys with wooden wheels replacing the former metal and rubber assembly. The Colson Corp., which will make no steel vehicles for children during the war, displayed a velocipede with wooden frame, handlebars, axles, and wheels. Tires were of reclaimed rubber.

No new items of rubber were introduced, and a few articles of metal and rubber for which no close substitutes are available have been dropped from producers' lines. Some rubber toy manufacturers are concentrating production on defense and essential civilian goods. Many of these firms displayed the playthings they previously made, but were taking no orders for 1942 delivery. Firms who had small stocks of rubber and rubberized fabric dolls, rubber balls, floating and beach toys, and small vehicles reported sold out conditions on the first and second days of the Fair. Makers of model airplanes are confronted with the difficulty of securing rubber bands. Doll manufacturers were reported facing increasing difficulties especially with regard to substitutes for rubber in movable arms and legs. Supplies of top-grade basketballs and footballs are conditioned by the amount of rubber bladders manufacturers have on hand. Since leather substitutes contain rubber, covers for cheaper balls are also difficult to obtain.

The Auburn Rubber Corp., Auburn, Ind., displayed molded rubber toys of reclaim including farm animals, racing cars, tractors, machine guns, army trucks, tanks, battleships, airplanes, and other novelty items.

The permanent exhibit of the Barr Rubber Products Co., Sandusky, O., included balls, dolls, balloons, and novelties in designs introduced by this firm in recent years. Many of the toys have been wrapped in cellophane as a preservation measure.

Collette Mfg. Co., Amsterdam, N. Y., showed its line of juvenile sporting goods including the Fly-Hi Bouncer, a valve-type six-inch ball with rubber bladder.

The Fulton Specialty Co., 200 Fifth Ave., New York, N. Y., presented rubber stamping and coloring sets, rubber type outfits, and sign markers.

Rubber quoit sets with rubber mats, bat tennis balls, and deck tennis rings of rubber were among the playthings of the General Sportcraft Co., 232 Madison Ave., New York, N. Y.

Rub-Er-Shot, a repeating rubber band shooting gun, was demonstrated by the Goosmann Mfg. Co., Grand Rapids.

Latexture Products, Inc., 17 Rose St., New York, N. Y., showed Joanne's Fashion Designing Set which included a 20-inch doll of molded reclaimed rubber with detachable arms, and the same model in a durable plastic recently designed.

Mar-Quoits and pitching horseshoes were featured by the Martin Rubber Co., 200 Fifth Ave., New York, N. Y.

A sheet rubber chess and checker board was among the games offered by William Rott, Inc., 142 W. 24th St., New York, N. Y.

The Seiberling Latex Products Co., Akron, O., announced to vistors that it was devoting its efforts to production of defense items.

The Sun Rubber Co., Barberton, O., showed airplanes, automobiles, and trucks of reclaim.

The Superior Type Co., 1800 W. Larchmont Ave., Chicago, Ill., had rubber stamp, sign, and type sets with educational, humorous, and defense subjects, and toy rotary printing presses with rubber type, dies, and cement.

Just prior to the Fair's opening Leon Henderson, OPA administrator, requested that no price increases on toys, games, dolls, and wheel goods above the January 15 level be made. If such increases had been made, cancellation was requested.

Farish Discusses Synthetics

In a statement on March 10, W. S. Farish, president of the Standard Oil Co. of New Jersey, 26 Broadway, New York, N. Y., said that an investment of $700,000,000 to $800,000,000 in plant capacity would be necessary to supply the entire country's civilian and military rubber needs. The cost to produce buna-type rubber was said to be $1,000 a ton of yearly capacity, and for butyl rubber, $700 a ton on a yearly basis. Buna rubber would cost, Mr. Farish estimated, about 30¢ a pound; while butyl could be produced for about half this amount. Tires from butyl rubber should give satisfactory service at speeds up to at least 35 miles per hour and should last for 10,000 miles.

Mr. Farish reported that his company, prior to Pearl Harbor, had spent or contracted for $12,000,000 in building plants and providing raw materials for making synthetic rubber. The company then had in operation about 5,000 tons a year synthetic rubber capacity and had under construction nearly 15,000 tons additional capacity. Since that time, he pointed out, the company has undertaken to produce for the United States and Canadian governments a total of over 200,000 short tons of special synthetic rubber and raw materials for buna rubber, with operations to be in full swing by mid-1943.

In regard to patents, Mr. Farish said, "There are no patent questions involved. Patent agreements were arranged and signed with government approval last December covering all questions bearing on buna rubber. Basic buna rubber patents have been allowed 1% of the cost of the rubber. On this basis the royalty would be about 2½¢ on a $15 synthetic rubber tire.

"On butyl rubber our company is offering to industry and the government royalty-free licenses for the duration of the war and reasonable royalties, to be determined by government authorities, thereafter."

Mathieson Alkali Works, Inc., 60 E. 42nd St., New York, N. Y., is celebrating its fiftieth anniversary, having been incorporated in Virginia in 1892. The firm, which has plants at Saltville, Va., Niagara Falls, N. Y., and Lake Charles, La., manufactures alkalies, chlorine, synthetic ammonia, caustic soda, and numerous other products. All three plants now are busily engaged with defense orders.

Thermoid Co., Trenton, N. J., is showing a film, "Keep 'Em Holding", which describes the entire field of hydraulic brake operation and approved service methods. Sales of the company and its subsidiaries during February totaled $1,165,560, contrasted with $875,746 in January and $847,064 in February, 1941.

Wilmington Chemical Corp., Wilmington, Del., recently opened an office at 10 E. 40th St., New York, N. Y.

Rubber Dealer Says Ample Supplies Available

Elliot E. Simpson, a director of L. Drexsage & Co., Inc., 29 West 34th St., New York, N. Y., crude rubber brokerage, released a series of statements in March concerning rubber supplies available to the United States and criticizing government officials for a lack of foresight and knowledge with regard to the rubber situation. The supply of rubber from various sources in the Western Hemisphere is ample to meet all civilian as well as defense needs for the duration of the war, he said, pointing out the extent of guayule acreage in Mexico, *Hevea* in Central and South America, and scrap sources in this country. He also reported the development of a hybrid *Hevea* plant by J. A. Tatro, of Tampa, Fla. Reclaiming facilities, Mr. Simpson declared, could be quickly expanded to a million tons annually by converting machinery in rubber manufacturing plants and second-hand machinery in dealers' stocks. He added that he would appear late in March before the House Committee on Interstate and Foreign Commerce to testify on scrap rubber supplies.

Ecuador to Increase Rubber Production

Dr. Roberto Levi, of the Ministry of Agriculture of Ecuador, in the United States on a special economic mission concerned with furnishing the United States with supplies curtailed by war, expressed confidence that Ecuadorian 1941 rubber production of about 700 long tons could be quadrupled in 1942. Eventually the production can be increased to six or seven times the recent output, he stated. Highways in the remote areas, which are scheduled for completion by early summer, will facilitate transportation of supplies and the crude product. Dr. Levi said that plans are in progress for training gatherers and plantation workers of which Ecuador has a sufficient number. Rubber free from dirt and adulterants was also promised.

National Association of Manufacturers recently formed a war committee to function as a liaison instrument between industry and the War Production Board, or any other governmental agency covering output of war supplies and equipment. The new committee, with headquarters in Washington, includes among its 21 members the following: John L. Collyer, president, B. F. Goodrich Co., Akron, O.; R. H. Dunham, chairman, Hercules Powder Co., Wilmington, Del.; Lammot du Pont, chairman, E. I. du Pont de Nemours & Co., Inc., Wilmington; Harvey S. Firestone, Jr., Firestone Tire & Rubber Co., Akron; J. Howard Pew, president, Sun Oil Co., Philadelphia, Pa.; Nelson W. Pickering, president, Farrel-Birmingham Co., Inc., Ansonia, Conn.; and Hopewell L. Rogers, Belden Mfg. Co., Chicago, Ill.

U. S. Rubber Announcements

United States Rubber Co., 1230 Sixth Ave., New York, N. Y., has been awarded a contract by the War Department to operate a new plant for making trinitrotoluene, to be under direction of the company's Naugatuck Chemical Division. John E. Caskey, assistant general manager of the Naugatuck Chemical, has been named manager of the TNT plant, to be known as the Pennsylvania Ordnance Works.

U. S. Rubber is conducting a nationwide advertising campaign stressing the importance of the family car in the country's transportation system. The campaign is distinctive in advocating conservation and at the same time offering constructive suggestions for budgeting mileage so that cars may be kept running. Should the car be stored for the duration, an unprecedented demand on public vehicles would result, calling for more such equipment with attendant demand for strategic materials needed elsewhere. Real conservation, according to the company, requires that a car be kept in service for necessary driving.

Walter J. Geldard, of the development and sales service staff of Naugatuck Chemical, at Naugatuck, Conn., and formerly with Fisk, has been transferred to the company's New York office as assistant to Wm. F. Tuley, sales manager of rubber chemicals and reclaim.

S. P. Thacher, manager of the field engineering and service department, U. S. Rubber, urges motorists to increase tire pressures to obtain maximum tread mileage. He declared that if recommendations for operating pressures below 30 pounds be raised to that figure and recommendations of 30 pounds or above be increased to 35 pounds, maximum tread mileage would be obtained, and steering would be easier, although the riding qualities would be slightly harder. Mr. Thacher further stated that maintaining proper tire inflation at all times is most important, for it has been found that if tire inflation is five pounds below the correct pressure, tread life will be reduced by as much as 20%.

Thomas H. Young, U. S. Rubber's director of advertising, is now chairman of the membership committee of the Association of National Advertisers.

Fred H. Pinkerton, of the company's wire department, told the Eastern New England Section of the International Association of Electrical Inspectors at a recent meeting in Boston that much rubber could be saved by simplification and standardization of the present building wire code.

The Clark Rubber Corp., Trenton, N. J., has filed a certificate of dissolution in the office of Secretary of State, Trenton. The company closed its plant after having been in business but a short time. S. K. Young, of 9 Rockefeller Plaza, New York, N. Y., was president.

U. S.-Brazil Agreement

To implement the resolutions of the recent meeting of the Foreign Ministers in Rio, His Excellency Dr. Arthur de Souza Costa, Minister of Finance of Brazil, and officials of the United States last month concluded a series of important agreements designed to fortify the security of the American Republics. These agreements consist of the following:

1. The Finance Minister of Brazil and the Acting Secretary of State signed an exchange of notes providing for a program for the mobilization of the productive resources of Brazil, and for a line of credit of $100,000,000 to be made available through the Export-Import Bank.

2. Officials of the Export-Import Bank and the Metals Reserve Co. signed agreements with the Minister of Finance of Brazil and the British Ambassador for the development of the Itabira mining properties and the Victoria-Minas Railroad, with accompanying arrangements for the procurement by the United States and Great Britain of the high-grade iron ores to be produced in these properties.

3. The Ambassador of Brazil and the Acting Secretary of State signed an agreement providing for expanded assistance to Brazil under the provisions of the Lend-Lease Act of March 11, 1941.

4. The Brazilian Minister of Finance and the Acting Secretary of State signed and exchanged notes providing for the establishment of a five-million-dollar fund by the Rubber Reserve Co. to be used in collaboration with the Brazilian Government in developing the raw rubber production of the Amazon Valley and adjacent regions. The notes were accompanied by an agreement whereby the Rubber Reserve Co. agreed to purchase Brazilian raw rubber for five years.

Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh, Pa., according to President R. L. Clause, has named as general purchasing agent M. E. Carlisle, who joined the company in 1929 and lately had been assistant purchasing agent. He succeeds J. A. Bechtel, who is retiring after 50 years with the organization, but will be available in 1942 in an advisory capacity.

R. B. Tucker, director of glass sales at Pittsburgh Plate, has been elected a director to succeed H. A. Galt, who is retiring after more than 40 years with the company. Mr. Galt was one of the founders of the chemical business in Harberton, O., now known as the Columbia Chemical Division of the Pittsburgh Plate Glass Co.

Pittsburgh Plate also has designed a new "Roll of Honor" plaque for organizations having employes in the armed forces. The plaque is of polished black Carrara glass decorated with gold leaf. Names may be painted on temporarily and then permanently inscribed by sandblasting in the order desired.

L. Albert & Son, dealer in rubber machinery, is operating about 95% on defense work at its plants at Trenton, N. J., Los Angeles, Calif., Akron, O., and Stoughton, Mass. New equipment is being added to the last plant. The company has acquired the Hygrade Rubber Co. plant at Salem, Mass.

Illinois Institute of Technology, Chicago, Ill., a consolidation of Armour Institute of Technology and Lewis Institute, formerly organized a New York chapter of its alumni at a dinner-meeting held at The Chemists' Club, New York, N. Y., on March 11. Robert I. Wishnick, president of Wishnick-Tumpeer, Inc., and C. Donald Dallas, president of Revere Cooper & Brass, Inc., both graduates of the Institute, were the hosts for the evening.

The United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C., recently reorganized its Division of Industrial Economy, simplifying the administrative procedures so that an even more effective contribution may be made to the war effort. Thus under the former set-up Everett G. Holt, rubber expert and industrial consultant to the rubber industry, acted also as chief of the Consumption Materials Unit, with administrative duties relating to a long list of commodities other than rubber. Now, however, his entire time has been freed to devote exclusively to that commodity.

Pierce-Roberts Rubber Co., Trenton, N. J., has been compelled to lay off some help because of curtailed production. President Harry W. Roberts recently returned from a three-week vacation at Ormond Beach, Fla.

Ridbo Laboratories, Inc., on March 15 moved to its new laboratories at 111-117 Pennsylvania Ave., Paterson N. J.

Crescent Insulated Wire & Cable Co., Trenton, N. J., is operating with three shifts in some departments and two in others. C. Edward Murray, Jr., vice president, reports difficulty in securing necessary materials. Mr. Murray has been renamed president of the Trenton Country Club.

Foster D. Snell, Inc., 305 Washington St., Brooklyn, N. Y., plans another Laboratory outside New York in the near future. During the past year the firm increased its laboratory space by more than 50%.

Nearpara Rubber Co., Trenton, N. J., announces that while the demand for reclaimed rubber is good, the concern is unable to secure enough material to fill orders.

The Puritan Rubber Co., Trenton, N. J., is having difficulty in securing experienced help because of the number of employes being drafted into the government service.

OHIO

Goodrich Announcements

The B. F. Goodrich Co., Akron, reports that for more than 30 years it has been a major consumer of guayule and in 1940 accounted for more than 50% of the domestic consumption.

Goodrich at its Akron plant is instructing Army maintenance crews in tire conservation.

President John L. Collyer recently declared that the nation's greatest rubber stockpile is in the form of unused mileage in the 173 million tires and tubes now in possession of American consumers. The rubber content of these tires and tubes exceeds 1,200,000 long tons, or nearly twice the nation's stockpile of new rubber.

George A. Fowles has been named a sales engineer in the Goodrich synthetic sales division, with cable and wire insulation problems as his special field, announced J. R. Hoover, manager of the division. Mr. Fowles has had considerable experience in insulation and at one time worked for the Anaconda Wire & Cable Co., Pawtucket, R. I., as well as several public utilities.

Goodyear Tire & Rubber Co.

A. L. Steele, manager of Goodyear's retail sales division in its retail stores department, has been appointed industrial specialist in the Procurement Division of the United States Army Signal Corps. Mr. Steele is the sixth Goodyear man loaned to government agencies during the war for specialized work. The others include: L. J. Bornhofen, manager, sales promotion, loaned last fall for industrial promotion at Washington; H. P. Protheroe, manager of mechanical goods compounding, loaned on rubber conservation; H. R. Rynerson, manager, merchandise planning; P. E. Hanaver, mechanical goods sales; T. P. Hogsett, budget sales; E. L. Gell, Cincinnati salesman, who joined the Tire Rationing Board of OPA.

V. Y. Bell, the company's district sales manager at Cleveland, has been loaned for an indefinite period to The United China Relief to solicit funds for its ten-million dollar campaign.

Clarence O. Bell, since 1929 flying sales engineer for Goodyear, has been made manager of the company's airplane division, aeronautics sales department.

Goodyear engineers have announced that contrary to current reports, increasing tire inflation will not make tires last longer, but will even shorten their life for at least two reasons. First, such tires will bounce over uneven spots on the road to result in a spinning action that has a buffing effect on the tread; too much air causes slippage between tire and road. Second, overinflated tires are more susceptible to fabric breaks when they strike hard objects as stones or sharp bumps.

(*Continued on page 92*)

CANADA

Some Rubber Restriction Results

Canada has launched a campaign to salvage 25,000 tons of tires and other rubber articles from garages and private homes. This will yield about 18,000 tons of reclaimed rubber and meet immediate needs, officials say.

It is understood that the Canadian Government through the Controller of Supplies released a half ton of crude rubber for shoe gores or similar materials. Each manufacturer will be entitled to 10% of his 1941 consumption to enable him to finish shoes in process.

New tires will not be issued for buses unless it can be shown that the latter perform an essential service, C. D. Howe, Minister of Munitions and Supply, last month told the House of Commons at Ottawa.

No used tire may lawfully be sold for more than 75% of the value of a new tire, according to Samuel Godfrey, WPTB Administrator Officer for the Province of Alberta.

Mr. Howe on March 23 announced that a 40-mile-an-hour speed limit had been established in Canada to save rubber and gasoline. He also declared that "the government will not hesitate to commandeer tires from private owners of non-essential vehicles whenever that rubber is needed," although such a move is not an immediate prospect. Mr. Howe further stated that tire retreading would be limited to commercial vehicles and buses and for transportation of workers in war plants without any other means of transportation.

Hot water bottle manufacturers in the Dominion find it necessary to eliminate all colors but one and to limit styles to two.

Pencil makers believe that the rubber eraser soon will disappear from their products in order to conserve crude rubber.

Scarcity of rubberized materials will make severe changes in the production of raincoats.

A delegation representing Canadian rubber workers recently appealed to government officials to protect interests of employes likely to become unemployed as a result of the rubber shortage. Labor Minister Humphrey Mitchell promised to make immediate surveys in localities where rubber factories are located. The possibility of converting rubber plants to munitions works is also to be investigated, it is reported.

Clarification of the rubber situation appeared recently in newspaper advertisements by the Department of Munitions and Supply in the form of questions which the average motorist might ask and answers explaining the ruling and reasons for rubber conservation.

C. S. Band, vice president, Gutta Percha & Rubber, Ltd., Toronto, Ont., has been elected a director of the Toronto General Trusts Corp.

New Committees Formed

The Department of Munitions and Supply recently confirmed the appointment of two committees which for some time have been cooperating with the Controller of Supplies on problems relating to synthetic rubber production. The first committee, known as the rubber substitutes advisory committee, comprises: J. R. Nicholson, deputy controller, chairman; Wm. H. Funston, Jr., president, Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont.; Paul C. Jones, president, Dominion Rubber Co., Ltd., Montreal, P. Q.; A. G. Partridge, president, Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ont.; and G. W. Sawin, president, B. F. Goodrich Co. of Canada, Ltd., Kitchener, Ont. The synthetic rubber advisory committee includes: Mr. Nicholson; J. H. Boyd, Jr., assistant to the president, Hycar Chemical Co., Akron, O., U. S. A.; W. A. Gibbons, director, General Development Division, United States Rubber Co., Passaic, N. J., U. S. A.; D. M. Morrison, of Montreal; and R. K. Stratford, of Sarnia, Ont., with R. Smith as alternate.

P. Horace Boivin, of Granby Elastic Web Co., Ltd., Granby, P. Q., who is director of narrow fabrics under the clothing and textiles administration, Wartime Prices and Trade Board, last month announced formation of an elastic allocation committee to pro-rate supplies of elastic among Canadian manufacturers. The new committee is composed of A. D. Starke, Hamilton Cotton Co., Ltd., Hamilton, Ont., chairman; A. G. McKinnon, Canadian Lastex, Ltd., Montreal, P. Q., secretary; and F. MacElwain, A. Stein & Co., Toronto, Ont.; K. H. Harvey, Harvey Wood, Ltd., Toronto; A. Ferguson, Spencer Corset Co., Rock Island, P. Q.; A. Zavalkoff, Dominion Gaiter Co., Montreal; and A. Rook, H. W. Gossard Canadian Co., Ltd., Toronto.

E. M. Proctor, Canadian representative to the Bureau of Industrial Conservation in Washington, D. C., U. S. A., will head the new scrap rubber division which will acquire all existing stocks of scrap rubber in Canada on behalf of the government, according to Munitions Minister C. D. Howe. The division will handle arrangements for government purchase of all available scrap rubber and payment by the government of all freight charges involved in transporting the scrap to Montreal and Toronto where it will be converted into reclaimed rubber. The division will also have control over the basic prices fixed for all scrap rubber articles sold for reclaim purposes. Mr. Proctor will devote most of his time to the campaign for collecting 25,000 tons of scrap rubber this year, but will continue to act as Canadian representative to the Washington bureau.

Ames Holden Tire & Rubber Co., Ltd., Montreal, P. Q., on May 1 will redeem at $105 and accrued interest each, $23,700 worth of First Mortgage 7% Gold Bonds.

Polymer Corp., Ltd., Toronto Ont., recently formed to carry out the government's synthetic rubber manufacturing program, has named Arthur L. Bishop president. It is expected that four plants will be required for the three steps in the manufacturing process to be used; production should begin before the end of 1943, and capacity output is set at 34,000 long tons a year. The entire output of the synthetic rubber project has been earmarked for war purposes.

R. S. Jane, research chemist, Shawinigan Chemicals, Ltd., Montreal, P. Q., addressed the Engineering Institute of Canada, Montreal Branch, March 5, discussing "Synthetic Rubber."

L. S. Hewes, of The Rubberset Co., Ltd., Gravenhurst, Ont., has been appointed director of the brush division under Furniture Administrator J. E. Ferguson of the Wartime Prices and Trade Board.

Drummondville Cotton Co., Ltd., 754 Victoria Sq., Montreal, P. Q., according to Manager J. W. Yaxley, has undertaken considerable plant expansion for the manufacture of fire hose duck.

Montreal Technical School, Montreal, P. Q., is giving special courses on how to save tires.

Canadian Engineering Standards Association at a meeting in Montreal, P. Q., early last month, in a move to conserve strategic materials, is revising specifications. Thus in rubber-covered building wire the use of reclaim is permitted.

Cambridge Rubber, Ltd., Montreal, P. Q., has made General Manager James G. Prout a director and a vice president; he will continue in charge of sales. W. C. Steele, in charge of the Vultex division, also has been named a director as well as assistant treasurer of the Cambridge company.

The B. F. Goodrich Rubber Co. of Canada, Ltd., Kitchener, Ont., has appointed E. G. Wellheiser, with the company more than 16 years, Winnipeg, Man., district manager of the footwear division.

John A. Barber, of Goodrich, has been named WPTB representative in charge of the sub-regional office in Kitchener.

The Dominion Department of Munitions and Supply, Ottawa, Ont., recently announced the awarding of the following contracts: *clothing,* General Rubber Co., Ltd., $46,137, Miner Rubber Co., Ltd., $266,048; *dockyard stores,* Gutta Percha & Rubber, Ltd., $6,427; *land transport,* Dunlop Tire & Rubber Goods Co., Ltd., $554,493, Firestone Tire & Rubber Co. of Canada, Ltd., $1,091,865, Goodyear Tire & Rubber Co. of Canada, Ltd., $877,320; *ordnance,* Dominion Rubber Co., Ltd., $135,675; *personal equipment,* Dominion, $74,200, B. F. Goodrich Co. of Canada, Ltd., $11,890.

"Canadian Appraisers' Bulletin Miscellaneous No. 36", issued by the Commissioner of Customs, Ottawa, Ont., February 2, states that import and excise duties and taxes imposed in any country are to be disregarded in estimating the value for duty of goods imported into Canada, under an order in council of January 20, 1942. This ruling would apply to the excise tax put on certain rubber products in the United States.

Woodstock Rubber Co., Ltd., Toronto, Ont., has appointed H. J. Ross, vice president and general manager; Richard McIver, Montreal manager, succeeding G. Lalonde; and J. E. Boivin, special sales representative for Quebec City and district. All three men formerly had been with the Dominion Rubber Co., Ltd., Montreal, P. Q.

Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ont., as a service to its customers, according to Advertising Manager S. R. Skelton, plans to release copy regularly reporting on developments in the rubber industry, showing how the company is meeting them.

The company has also issued for free distribution a 16-page booklet, "How to Make Your Tires Last Longer." A foreword points out that today there are about 1,480,000 cars and trucks in Canada, and if each driver saves only eight ounces of rubber a month, or two ounces a tire, it will save 370 short tons a month for war needs.

R. W. Richards, Goodyear general sales manager, has reported that the new Toronto factory recently made a tire entirely of reclaimed rubber. It is an emergency tire and is in the experimental stage, and it is not known how far development of the experiment will progress.

V. C. Davies, formerly office manager for the British Rubber Co. of Canada, Ltd., has been made vice president and general manager of Stag Shoe Co., Ltd., both of Montreal, P. Q.

MIDWEST

Thirty-five rubber firms in the Midwest recently paid 23,925 employes $789,000 in wages, declines of 1.1 and 7.6%, respectively, from the previous month.

Ames Supply Co., 564 W. Randolph St., Chicago, Ill., according to Sales Manager F. R. Marshall, is manufacturing the Victory typewriter platen to take the place of those formerly made of crude rubber.

Allen M. Varney recently resigned from the Boston Woven Hose & Rubber Co., Cambridge, Mass., to become chief chemist of the La Crosse Rubber Mills Co., La Crosse, Wis.

OBITUARY

Albert S. Howard

ALBERT S. HOWARD, former plant manager of Everlastics, Inc., Pawtucket, R. I., died February 24 at his home in South Attleboro, Mass., after a long illness. A native of Worcester, Mass., he was educated in the public schools at Clinton, Mass., and the College of Fine Arts of the Philadelphia Textile School. Mr. Howard had been associated with the textile industry his entire business lifetime and was with the Smith Webbing Co. and its successor Everlastics, Inc., about 35 years. He retired two years ago.

He is survived by his wife, one daughter, two sons, and two grandchildren.

Frederick S. Minott

FREDERICK SHEPARD MINOTT, retired president (1907-1920) of the old Goodyear Rubber Insulating Co., New York, N. Y., died February 28 in Beacon, N. Y., after a long illness. He was born in Orange, N. J., January 4, 1868, attended Laurenceville School and graduated from Princeton in 1889.

Mr. Minott was a member of the University, Racquet and Tennis, and Princeton clubs, and Automobile Club of America.

Funeral services were held March 3. Burial took place in Smithtown, L. I., N. Y., on March 9.

Two brothers survive.

Parry D. Saylor

PARRY DORLAND SAYLOR, 63, formerly vice president and general manager of the Dunlop Tire & Rubber Corp., Buffalo, N. Y., and also former president of the Goodyear Tire & Rubber Co. of Europe, London, England, died at his home in Litchfield, Conn., February 20. At the time of his death Mr. Saylor was chairman of the board of Canada Dry Ginger Ale, Inc., which he had joined as general manager in 1925.

Services were held at his late residence February 23.

Herbert Standring

HERBERT STANDRING, former editor of *India-Rubber Journal* and *The Rubber Age,* both of London, England, died January 8 at South Goldstone, England. Born March 10, 1860, he devoted more than 50 years of his life to publicizing rubber industry developments. He joined the staff of *India-Rubber Journal* in 1884, a year after its founding, and served continuously in that capacity until 1912. In 1921, Mr. Standring was one of the organizers of the Rubber Club of Great Britain, which became the Institution of the Rubber Industry. He later founded *The Rubber Age,* a British monthly, from the editorship of which he retired a few years ago.

George W. Stephens

GEORGE WASHINGTON STEPHENS, former president of the Canadian Rubber Co., Ltd., Montreal, P. Q., Canada, now known as the Dominion Rubber Co., Ltd., also former president of the Montreal Harbor Commission, and Commissioner for the Saar Valley, passed away at the Good Samaritan Hospital, Los Angeles, Calif., February 6, from injuries received in an automobile accident. The body was cremated, and the remains brought back for burial in Mount Royal Cemetery, Montreal, where on February 18 funeral services took place. Chief mourners were the widow, an aunt, and a niece.

Major Stephens was born in Montreal in 1866 and was educated at the High School of Montreal, McGill University, and at universities in France, Germany, and Switzerland. In politics he was a Liberal and from 1905 to 1908 sat in the Quebec Legislature. Although popularly known as Major Stephens he held the rank of Lieutenant Colonel.

August von Parseval

AUGUST VON PARSEVAL, an early builder of non-rigid aircraft, died February 23 in Germany. He was born at Frankenthal, Germany, February 5, 1861. As a young infantry officer he built his first practical aircraft in 1892. His first successful dirigible was built in 1905, and in 1907 he resigned his army commission to devote his time exclusively to aeronautics. He continued to construct improved motor-driven balloons, and many of his dirigibles were used in the first World War.

From 1911 to 1925, Major Parseval was professor of aviation at the Charlottenburg Technical College. He was the author of many books on aviation among which was "Count Zeppelin and German Aviation."

Albert E. Miller

ALBERT ERNEST MILLER, 42, pulp and paper mills specialist of the Dominion Rubber Co., Ltd., Montreal, P. Q., Canada, died suddenly March 5 at Dolbeau, P. Q. Masonic services were held March 7, with interment in Mount Royal Cemetery.

Born and educated in Montreal, Mr. Miller joined the Dominion company in 1916. He was also a past senior councillor of the United Commercial Travellers' Association of America, a member of the Dominion Commercial Travellers' Association and of Rosemere Golf Club. Mr. Miller served in the last world war with the 23rd Battalion, C.E.F.

Surviving are his wife, two daughters, a sister, and two brothers.

James D. Tew, Jr., 29, son of the former president of The B. F. Goodrich Co., Akron, O., was reported killed in action March 1 over Malta while fighting with the R.A.F.

LATIN AMERICA

BRAZIL

Brazilian figures show that crude rubber exports totaled 8,584,750 kilos during the first nine months of 1941, distributed as follows, in kilos: Argentina, 2,372,958; Chile, 17,767; Great Britain, 370,120; Japan, 163,000; Portugal, 14,040; Germany, 1,500,000; Venezuela, 300; Asiatic Russia, 370,000; United States, 3,776,565.

Figures from another source give total exports for the year 1941 (including ships to South Brazil) as 17,825 metric tons (metric ton equals 1,000 kilograms, equals 2,204.6 pounds) shipped as follows, in metric tons: United States, 4,744; United Kingdom, 504; Portugal, 6; Germany, 1,500; Italy, 200; Japan, 163; Argentina, 2,665; South Brazil, 8,043 tons.

There are some discrepancies in these two sets of figures, even if allowance is made for the time difference and the inclusion in the latter set of South Brazil figures, but they are not very important except in the case of Russia.

It is worth noting that Germany was able to obtain 1,500 metric tons of rubber from Brazil in 1941, but judging from the fact that the export figures for the entire year show no change as compared with those for the nine-month period, it seems permissible to say that no crude rubber was sent to Germany by Brazil in the latter part of the year. This point, of course, applies also to Japan. At the same time the data indicate that the third Axis partner, Italy, was able to obtain 200 metric tons of rubber in the last quarter of 1941.

EUROPE

GREAT BRITAIN

Plastics Industry Unfair to the U. S.?

The British Plastics Federation vigorously denies reports circulating in America that the British plastics industry is not playing fair with the United States and is producing fancy and other non-essential plastic goods in unduly large quantities with a view to increasing its export business at the cost of the United States. The facts are, it is shown, that the large majority of British plastics firms are engaged almost exclusively in producing materials for defense purposes, and so important is their work, especially for airplane construction, that the government recently decided to apply the Essential Works Order to those branches of the plastics trade manufacturing and working with molding powders. Furthermore manufacturers of plastic fancy and household goods may produce only 25% of pre-war output over a given period, and there is not only increasing difficulty in obtaining powders for these purposes, but labor would balk at producing quantities of non-essential goods.

A catalog of moldings for exports was indeed produced at the direct request of the Board of Trade by the Plastics Export Group, and over 400 articles were illustrated and described in English, French, Spanish, and Portuguese. However the defense demands have necessitated a sharp curtailment of the export program, which has accordingly been put in "cold storage" until after the war. Exports of British molding powders have been severely restricted, and licenses are not issued for exports unless it can be satisfactorily shown that

the powder is required for essential purposes connected with the British war effort.

The Export Groups in general appear to have been the objects of suspicion, and they also assert that there is no foundation for this propaganda.

Restrictions Adopted as Rubber Supply Is Cut

The unexpectedly rapid development of events which within so short a time has left in the hands of Japan the chief rubber growing territories in the Far East confronts the British with urgent problems of supply. The sole remaining source of plantation rubber from which any appreciable amounts could now be obtained is Ceylon. Last year's output was estimated at about 90,000 tons, and even if production in the current year could be increased by 10% or even 20%, this would obviously be wholly insufficient to supply the United Nations, although there would be enough for the needs of England alone.

Great Britain produces little synthetic rubber and now has neither time nor adequate material available for large-scale expansion. So the obvious measures were to restrict the use of rubber and increase the production of reclaim, and immediately after Pearl Harbor the British Government took appropriate steps. The manufacture of a number of articles was prohibited, including toys, garden hose, bathing caps, dress shields, corsets, flooring, mats, stair treads and nosings, paving blocks and the like, and many other articles. At the same time manufacture of certain others, including hot water bottles, rubber bands, solid tiring (except for defense purposes) and various sporting goods were placed under license.

Hitherto the United Kingdom had used only about 7% of reclaim against roughly 38% in the United States. To increase the manufacture and the use of reclaim the Ministry of Supply started a drive to collect 50,000 tons of old rubber monthly. Maximum prices have been fixed for scrap, and the purchase and sale of scrap is to be strictly controlled. Furthermore the Rubber Control Board has been reorganized, and a supervisor has been appointed to take charge of the collection of scrap for reclaiming.

But both in industrial circles and in the House of Commons there have been many expressions of dissatisfaction not only over the scope of the measures, but also the manner in which it is proposed to carry them out. Thus the replacement of Sir Walrond Sinclair as Rubber Controller by F. D. Ascoli is unwelcome to many in the rubber industry. It is a fairly widespread opinion that the rubber growing interests have prevented the accumulation of adequate supplies of crude rub-

ber both here and in the United States, and rubber growers as well as tire manufacturers are accused of having obstructed the timely expansion of the British reclaiming industry. Mr. Ascoli is a plantation rubber expert connected with the Dunlop company, which produces crude rubber and also manufactures tires, and it is felt that a man lacking these affiliations but having a more intimate knowledge of the rubber manufacturing industry and better able to appreciate the proper value of reclaim would have been a more suitable choice.

Synthetic Rubber from Castor Oil

The use of castor oil as a base for the production of synthetic rubber is suggested in *British Plastics*, which points out that the undecylenic acid obtained from castor oil may be converted into polymerizable undecadiene by hydrogenating the acid to undecylenic alcohol and dehydrating the latter to undecadiene. When heated in the presence of catalysts, the monomer of undecadiene will polymerize to a rubber-like mass.

U. S. S. R.

Synthetic Rubber Tires

Scientists in Soviet Russia had hardly found out how to produce a useful synthetic rubber than attempts were made to employ it in the manufacture of tires. As early as December, 1932, the first tires with tread and walls of 100% sodium butadiene rubber were made on a trial production scale at the Krasnaya Treugolnik, and soon the Leningrad and Jaroslaw tires factories were working along the same lines.

From the very outset it was clear that the main difficulty to be overcome in the use of synthetic rubber for tires was the lack of adhesion and cohesion of this material, and that the usual methods of tire building would have to be modified. Observation indicated that tire building could be facilitated and expedited if the parts were put together while they were still hot; so procedure was planned to permit tread and walls to be put on the carcass immediately after leaving the calender, before they had time to cool off. Processing was facilitated by the introduction of naphthenic acid in the mixes. In this way 73 synthetic tires were produced at the Treugolnik factory, and in laboratory tests some of the 4.75x19 tires gave a mileage of 21,670 kilometers;[1] while some of the 6x20 tires gave 38,764 kilometers.

Although the mileage seemed satisfactory, even under these test conditions, the plies showed a marked tendency to separate and the tread to come away from the walls; this defect was to some extent remedied during subsequent work at the Jaroslaw factory when tires were built up on drums instead of on cores, and treads and walls were made in the form of a continuous strip.

First 9,375-Kilometer Test

The first attempts at making S.K. (Russian butadiene synthetic rubber) tires on a production scale were not undertaken until December, 1932, but by mid-1933 the tire industry was ready to embark on a large-scale test. On July 6, 18 automobiles equipped with tires of natural imported rubber, of *tausagyz* rubber, and of synthetic rubber left Moscow on a round trip to Kara-Kum, Turkestan, a distance of 9,375 kilometers. The route followed a south-easterly direction from Moscow into Asia, across the Kirghiz Steppes, around the north of the Sea of Aral and through the lesser Kara-Kum desert in Turkestan down to the mountainous borders of Afghanistan and as far east as Samarkand, before turning west to Bokhara and finally to Kara-Kum proper. The return journey continued west past Baku and Tiflis in the Caucasus, then north to Rostov-on-the-Don, Voronezh, and Moscow. On December 30, 1933, the travelers reached their final destination, and they had encountered temperatures ranging from 10 to 42° C.; they had passed over plains and mountains, deserts, and salt

[1] One kilometer equals 0.62 U. S. mile.

marshes; and part (25%) of the way there had been paved roads and graded, unpaved roads; but for the most part (over 50%) there had been ungraded dirt roads, often worn down into deep troughs by the passage of innumerable bullock carts; for about 10% of the way there had been no road at all, with some sections almost impassable because of the heavy, sticky mud, where it was hard to do more than 11 kilometers an hour, and other sections where jagged stones cut and pierced the tires. The average rate of travel was 21.7 kilometers an hour; on paved roads the rate had been 50 to 60 kilometers an hour.

Altogether 147 tires were used, in the following sizes: 34x7, 32x6, 29x5.5, 28x4.75, and some super-balloons, 800x200 millimeters. Twenty-nine tires were made entirely of imported natural rubber; 14 of natural rubber plus 9% reclaim; five entirely of *tau-sagyz* rubber; five with treads only of 100% *tau-sagyz* rubber and 100% natural rubber carcass; 32 with 100% S.K. treads and 100% natural rubber carcass; 10 with 100% S.K. treads and 50% S.K. carcass; 29 with 50% S.K. in the treads and 25% in carcass; 18 with 50% S.K. in treads only and 100% natural rubber carcass; and five with 25% S.K. in treads only and 100% natural rubber carcass. Imported natural rubber was used to make up the difference to 100% in each case. In all there were 94 tires made with S.K.—51 by the Leningrad and 43, including the super-balloon tires, by the Jaroslaw factories.

Certain of the S.K. tires early revealed the defects of the material, and in a relatively large number of cases the plies or part of the sidewalls separated, and in other cases the treads broke away completely, and the tires had to be replaced. Fourteen of the 16 S.K. tires that had to be discarded during the test because of manufacturing defects, chiefly loosening up of plies and treads, came from the Leningrad factory. In marked contrast were the Jaroslaw tires made with S.K., of which only two had to be discarded for these reasons; while not one of the five Jaroslaw tires having 100% S. K. treads and 50% S.K. carcass, and made on drums, showed these defects. Nor did the *tau-sagyz* tires have these failings. Of the 38 tires thrown out because of damage caused by driving conditions, 27 were S.K. tires (12 Jaroslaw tires), nine were of natural imported rubber, and two of *tau-sagyz* rubber.

Many of the S.K. tires completed the required mileage; and as some cars were sent back from Moscow to Gorkie immediately after the finish of the test, S.K. tires on these cars accumulated an additional 500 to 600 kilometers of travel. Considerable differences in mileage figures both in regard to individual tire and group tire performance were found. A series[2] of four tires made with treads of 100% S. K. and carcass 100% natural rubber (Leningrad tires) made the worst over-all showing, averaging only 1,590 kilometers, with a maximum of 2,500 kilometers; a further series of three and another of four tires made with the same type of S.K. also gave unsatisfactory mileage; but for other series with 100% S.K. treads, averages of 8,800 kilometers and 7,710 kilometers were reached; while two series of tires with 100% S.K. treads and 50% S.K. carcass averaged 8,120 kilometers and 7,200 kilometers, respectively. On the whole, however, it may be said that the tires with 50% S.K. in the treads plus 25% S.K. in the carcass did worse than those with the 100% S.K. treads; single tires of these groups had to be thrown out after going only 130 and 160 kilometers; while average mileage was generally on the low side. Yet the super-balloons with only 25% S.K. in the treads were among the best of the tires and gave highest individual mileage. The tires with 100% *tau-sagyz* rubber in the treads averaged 8,830 kilometers, and the all-*tau-sagyz* tires, 9,050 kilometers.

As might have been expected, the performance of tires of imported rubber was more uniformly satisfactory than that of the S.K. tires; five series, comprising 20 tires, gave average mileages of 8,800 to 9,900 kilometers; only one series of six tires averaged under 5,000 kilometers.

However, when individual S.K. tires were good, they were equal to the best of the natural rubber and certainly excelled them in abrasion resistance. Even in cases where S.K. tires had had to be discarded because of serious damage to walls

[2] Series in this instance means a group of tires made under the same manufacturing conditions.

and treads, the latter showed comparatively little wear. Before the test all the tires had been weighed, and again at the finish; it was then found that the average loss from abrasion for Jaroslaw tires with 100% S.K. treads was 64 grams per 1,000 kilometers; for other tires with 100% S.K. treads, it was 73 grams; for those with 100% *tau-sagyz* treads, 84 grams; and for the natural rubber tires, 89 grams per 1,000 kilometers.

Second Moscow-Kara-Kum-Moscow Test

Exactly three years later a second large-scale test was organized in which a fleet of 15 automobiles driven and cared for by women, again undertook the trip from Moscow to Kara-Kum and back, but this time a more northerly and less mountainous route was followed; the total distance was about 9,000 kilometers. In this trial 72 tires, 5.50x19, mostly four-ply, were tested; these included an entire series of 60 tires made with 65% S.K. in the tread and 75% in the carcass; seven with 100% S.K. tread and 75% S.K. carcass; and five with 100% S.K. tread and 100% S.K. carcass. Besides a series of inner tubes of 100% S.K. was compared with tubes of 100% natural imported rubber. All tires and tubes were made at the Jaroslaw factory. Finally, different valves were tested—a Schrader-type spring valve, a so-called Universal valve, and another springless valve.

On this trip the average speed was 30 kilometers an hour.

By the time about three-quarters of the distance had been completed, four tires had to be replaced because of separation of plies; only one of these was an all S.K. tire. Incidentally, it may be added that a tire of the series having 75% S.K. in the carcass and 65% in the tread was the first to be discarded on this account, and before a distance of 1,400 kilometers had been covered. In fact, most of the damage occurred during the first 3,000 kilometers of the route. Thereafter was relatively little trouble; so it was thought possible a "danger zone" might exist, and after passing this tires might be expected to give satisfactory service for many more miles.

Road conditions were mainly responsible for the fact that 12 tires had to be replaced. Sharp stones and other obstacles made cuts and holes in the tires; wheels went out of alinement and sagged; rims and bead rings broke through, and cords ruptured when sandy stretches that had been turned into veritable quagmires by rain had to be crossed. The matter of maintaining proper inflation of tires also caused difficulty. It was thought better to leave compressors behind and to pump tires up by hand. At the outset most of the tires were equipped with Schrader-type spring valves, but these were said to interfere with hand-pumping so that proper pressure could not be maintained. When this defect was first noticed, the women simply snapped off the spring ends of the valves; this practice seemed to help until it was forbidden. Then springless-type valves were substituted everywhere; the Universal-type was especially serviceable. Another factor contributing to chronic under-inflation was the considerable fluctuation in temperature in a day; even in summer there might be a difference of 15° C. in night temperature as compared with that of the day. In certain districts the nature of the terrain made it imperative to ride on under-inflated tires. It is characteristic of the general attitude of drivers in Russia that many women preferred to test the pressure of the tires by striking them instead of using a tire gage. The improper inflation, of course, resulted in excessive wear of the treads.

No details are given about the compound used for the S.K. tubes; they proved adequate, although spare tubes had a tendency to form heavy creases which could not be smoothed out. But apparently this did not cause too much trouble.

In general the performance of the tires in this test showed clearly the improvement in manufacturing S.K. tires that had been made in the three years intervening between the two tests; but it is equally clear that the lack of adhesion and cohesion of S.K. still impaired its value as material for tires.

Future Aims

Examination of the literature on S.K. tires published after still another three years, in 1939, reveals that despite continued progress in methods of building tires and preparing and handling S.K., the main defect in S.K. tires is still the same tendency of plies as well as of treads and carcasses to separate. But now some of the blame is also put on the driver,

who is accused of carelessness about inflation and braking, in mounting tires and generally taking care of them. Meanwhile the mileage has been further increased; tests on appropriate apparatus give 50,000, 70,000, and even 90,000 kilometers for individual S.K. bus tires. It may be mentioned that in 1936 several bus drivers were awarded prizes for getting from 100,000 to 140,000 kilometers under service conditions out of tires made from imported rubber.

The Russian rubber industry has set for itself the goal of making the best synthetic rubber and the best synthetic rubber tires in the world.

Up to 1940, a certain amount of imported natural rubber was used in the manufacture of S.K. tires, but the proportion had been steadily reduced. The third five-year plan, covering 1938-1942, provided for an increased percentage of S.K. in tires up to 95%. Another aim was to make all tires on drums and to mold all tubes. In view of the different climatic and road conditions prevailing in the various sections of the country, it was intended to develop special types of tires suited to regional requirements. Different types of cords and cord fibers will be investigated. The output of home-grown rubber was to be increased at the average rate of 350% a year, so that if the program is carried out as desired, the output at the end of 1942 should be 150 times what it was at the beginning of 1938.

Research was planned to promote the use of Sovprene (the Russian version of the neoprene type of synthetic rubber) for tubes, also in making tires—possibly by compounding it with S.K. or using it for some parts of the tires and S.K. for others. Similar tests were under consideration for *koksagyz* rubber. In addition, Russian guayule and the so-called vatochnik rubber were to be tried for tire carcasses.

FAR EAST

MALAYA

The Japanese now have in their hands all of what was formerly British Malaya and all its rich tin mines and vast areas of rubber. At the end of 1940 there were 2,522 rubber estates and probably ten times that many small holdings, with a total planted area of about 3,500,000 acres and output of 550,000 tons of rubber. These plantations ranged from tiny, primitively run native gardens of less than an acre to huge modern undertaking covering many thousands of acres. There were 54 estates, each over 5,000 acres and having its own modern factories fully equipped for preparing and packing rubber for shipment; with adequate roads and trucks and in some cases even railway lines to transport the rubber to the nearest storage or shipping point; with fine homes for the European staffs and long lines of little houses for the thousands of coolie workers; to say nothing of the many well-kept estate hospitals.

A few firms in Malaya manufactured rubber goods: the Singapore Rubber Works, which produced most kinds of rubber articles; the Wilkinson Process Co., maker of Linatex, which has been in such demand especially since the outbreak of the war for use in engineering, mining, railways, and even in aircraft construction; the Bata footwear company; besides several small rubber factories owned by Europeans and Chinese which made footwear, simple mechanical goods, ricksha tires, etc.

The Japanese themselves have for some years owned and exploited various rubber estates in Malaya and are therefore quite familiar with local conditions and methods so that if they can hold Malaya long enough, they will be able to make good use also of the plantations and equipment seized.

Editor's Book Table

BOOK REVIEWS

"Anhydrous Aluminum Chloride in Organic Chemistry." Charles Allen Thomas in collaboration with Mary Baluk and Ross W. Moshier and Herbert E. Morris. American Chemical Society Monograph Series. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y. Cloth, 6 by 9 inches, 972 pages. Index. Price $15.

About 60 years ago Charles Friedel and James Mason Crafts published their first papers describing the chemical reaction that bears their names. Today diverse and numerous syntheses involve the use of anhydrous aluminum chloride in the preparation of many compounds. In Mr. Thomas's volume the available published literature, including patent literature, has been gathered together from widely scattered sources, both scientific and industrial, to form an exhaustive treatise. The physical properties and manufacture of this effective catalyst are covered with satisfying completeness. In addition to the Friedel-Crafts syntheses and ring-closure reactions, the book considers a wide variety of other reactions involving the use of anhydrous aluminum chloride. Among these are addition reactions, aldehyde syntheses, dehydration condensations, aromatic rearrangements and migrations, condensations of aliphatic compounds, and polymerization. Considerable importance is also attached to the use of aluminum chloride in the petroleum industry where decomposition, polymerization, alkylation, and isomerization are reactions involved.

There are various references to the catalytic action of anhydrous aluminum chloride of direct interest to the rubber industry. These include the production of rubber derivatives and materials that can be used in conjunction with rubber. In the chapter on polymerization, aluminum chloride is described as a powerful polymerizing agent, but an erratic one which must be handled with care. Considerable attention is given to polymerization of isoprene in the presence of aluminum chloride with a discussion of the mechanism involved. The chapter treats the polymerization of olefins and diolefins; the copolymerization of diolefins with olefins, and with aromatic compounds; and other important aspects of polymerization.

"Cables and Wires." The Electrical Engineer Series—Volume 10. J. Rosslyn. E. Molloy, General Editor. Published by the Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y. 1941. Cloth, 8½ by 5½ inches, 184 pages. Indexed. Price $2.50.

The construction, selection, installation, splicing, and repair of paper, rubber, bitumen, and varnished cambric insulated electric power wire and cables form the basis of the clearly and effectively presented material in this book, which is augmented by more than 100 photographs, drawings, and tables. The making of rubber insulated cables is given attention in such processes as the tinning and covering of the conductor, vulcanization, and the application of mechanical protection. Methods of using self-vulcanizing tapes, and hot vulcanization by a portable vulcanizer that acts as a pressure mold and insures amalgamation of the insulation to the splice are given.

Standard tests which form the basis for rapid localization of faults and the modern equipment for carrying out these tests efficiently and quickly are discussed in the final chapters.

"Plastics in Engineering." Second Edition. J. Delmonte. Published by Penton Publishing Co., Cleveland, O. 1942. Cloth, 6 by 9 inches, 601 pages. Index. Price $7.50.

New chapters and technical data in the second edition reflect the numerous technological advances of the past two years which have influenced the plastics industry. Extruded plastics and resin-bonded plywoods are treated more fully than in the 1940 edition because of the recent and diverse developments in these products.

Among the newer plastics discussed are polyvinylidene chloride, polyamides, melamine-formaldehyde, and methyl cel-

lulose. Other new information on synthetic rubber, rubber-like resins, and adhesives, is included. New techniques and results of data on physical, thermal, electrical, and optical properties are given for the various materials discussed, and the limitations as well as the advantages of all types of plastics are covered. Much of the material is first-hand data which have been correlated by the author with results obtained from manufacturers and users in the various fields of application. The design information has been brought up to date to acquaint engineers and manufacturers with methods of adapting plastics to machine parts to replace strategic metals required for vital defense production.

"Advances in Colloid Science." Volume One. Edited by Elmer O. Kraemer in collaboration with Floyd E. Bartell and S. S. Kistler. Interscience Publishers, Inc., 215 Fourth Ave., New York, N. Y. January, 1942. Cloth, 6 by 9¼ inches, 434 pages. Indexed. Price $5.50.

Sixteen widely known chemists and chemical engineers from Sweden, Switzerland, Java, and the United States have contributed important papers on colloid science to this volume. Each study clearly shows the author's identification with the development of his subject, but there are also generous references to and discussion of the allied literature. The recent advances in colloidal chemistry of such materials as rubber latex, fibers and powders, starch, and inorganic gels are covered in several articles. Others deal with absorption analysis, synthetic-resin ion exchangers, frictional and thermodynamic properties of large molecules, solubilization in detergent action, and streaming birefringence and its relation to particle size and shape.

Recent investigations of the sizes and shapes of carbon black particles by indirect methods and the electron microscope are reviewed, and the divergent results summarized in a convenient table in Thomas F. Anderson's "The Study of Colloids with the Electron Microscope."

Ernst A. Hauser in "Anomalies in Surface Tension of Solutions" critically reviews the work in this field, limiting his study to some of the more outstanding cases. The theory, based on Gibbs' adsorption equation is cited, followed by a discussion of the discrepancies between theory and experiments. The effect of time and concentration on the surface tension is considered as well as the Jones-Ray effect and other related phenomena.

G. E. Van Gils and G. M. Kraay in "The Creaming of Rubber Latex" discuss the various factors affecting the creaming process: time, viscosity, mechanical effects, temperature, precoagulation, addition of soap, acidity (pH), concentration of electrolytes, concentration of the creaming agent, and rubber content. The authors, who hold that cluster formation and syneresis are successive phases in the creaming process, conclude with an explanation of the various creaming phenomena in terms of the theory which they have accepted.

Additional volumes covering world-wide developments in colloid science are planned by the editors when conditions warrant publication.

NEW PUBLICATIONS

"Priorities and Pyrometers." Wheelco Instrument Co., Harrison and Peoria Sts., Chicago, Ill. 6 pages. This bulletin explains the uses, priority requirements, supplies of, and substitutes for materials employed in the production of temperature measuring and control instruments. Asbestos, fabrics, and synthetics are listed as rubber substitutes for wire insulation.

"The Reclamation of Rubber." Hercules Powder Co., Wilmington, Del. 1942. 4 pages. This folder discusses reclaiming and the utilization of reclaimed rubber in an economy geared for war. There are descriptions and analyses of four Hercules products derived from the wood of the southern long-leaf pine and applicable in reclaimed rubber formulations. Vinsol resin is described as a stiffener, resistant to oxidation, and Staybelite resin as a tackifier with good aging properties. Solvenol and Tarol are softeners for reclaiming.

"Rubber Map of the World." Naugatuck Chemical Division of United States Rubber Co., 1230 Sixth Ave., New York, N. Y. This map graphically shows the relative importance of the various rubber producing areas of the world for 1940, with a summary of 1940 shipments from these areas as well as other pertinent statistics on shipments and consumption.

"Romance of Rubber." Compiled by the Writers' Program of the Pennsylvania WPA. Albert Whitman & Co., Chicago, Ill. 1941. 48 pages, illustrated. Price 50¢. The ingenuity and the hard work that were a vital part of the development of the rubber industry are described in this small book for children in elementary grades. The early methods of using rubber, plantation practice, the collection of wild rubber, and the making of tires and tennis balls are also briefly related.

"Management's Annual Report of Operations to Employes and Stockholders. 1941." Farrel-Birmingham Co., Inc., Ansonia, Conn. 8 pages. Diagrams and data show the trends of sales, wage payments, taxes, and earnings of the company. Pictographs express the three-year expansion of marine drives, gear generators, rolling mills, and extrusion presses, all important in war production, which now engages 98% of Farrel-Birmingham plant facilities.

"A.S.T.M. Standards on Electrical Insulating Materials." Prepared by A.S.T.M. Committee D-9 on Electrical Insulating Materials. American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa. December, 1941. Paper, 6 by 9 inches, 448 pages. Index. Price $2.25. Specifications for rubber electrical friction tape, insulating tape, electrical gloves, and matting, and a proposed draft for insulating blankets are included in the 58 specifications and tests in this volume, which covers insulating varnishes, paints and lacquers; molded insulating materials; plates, tubes, and rods; mineral oils; ceramic, paper, mica, rubber, and textile products.

Publications of the Goodyear Tire & Rubber Co., Inc., Akron, O. "Goodyear Fractional Horsepower V-Belts for Single Groove Service or Miscellaneous Light Machinery Drives—Engineering Data 1941." 16 pages. This booklet describes the construction, operation, and installation of Goodyear belts for single groove service and miscellaneous light machinery drives. There are various horsepower tables, and cross-reference charts for Goodyear and competitive belts of the same nominal cross-sections and lengths. "Goodyear Tire Treading Service." 8 pages. The descriptive material and illustrations shown in this pamphlet cover Goodyear tread designs for tires used on passenger cars, trucks, graders, tractors, and logging and mining equipment. "Goodyear Mechanical Rubber Goods." 640 pages. Natural and synthetic rubber hose, belt, packing products, and molded and lathe-cut goods, are among the wide variety of mechanical goods for the printing, railway, brewing and other industries that are offered in this new catalog.

RUBBER BIBLIOGRAPHY

SYNTHETIC RUBBERS. X. H. Barron, *Rubber Age (London)*, Jan., 1942, pp. 264-66; XI. Feb., pp. 288, 292.

THE PREPARATION OF SOFTENED RUBBER. Patent Specifications. *J. Rubber Research Inst. Malaya*, Oct., 1941, pp. 83-104.

A GUIDE TO THE RUBBER PLANTATIONS IN THE MALAYAN REGION. H. Ashplant, *India-Rubber J.*, Jan. 17, 1942, pp. 2-3, 6.

RUBBER PHOTOGELS. H. P. Stevens, *India-Rubber J.*, Jan. 17, 1942, pp. 9-10; Jan. 24, pp. 9-10; Feb. 7, pp. 7-8; Feb. 14, pp. 9-10, (Conclusion.)

THE NEW WAR DEVELOPMENTS AND RUBBER SUPPLIES. H. Ashplant, *India-Rubber J.*, Jan. 10, 1942, pp. 1-2.

BRAZIL'S RUBBER INDUSTRY. *India-Rubber J.*, Jan. 10, 1942, pp. 8-9.

SMALL-FARM RUBBER PRODUCTION. W. E. Klippert, *Agriculture in the Americas*, Mar., 1942, pp. 48-53.

SPECIFICATIONS FOR SCRAP RUBBER. *National Waste Review*, Feb., 1942, pp. 14-15, 18.

THERMAL REACTION OF ETHYLENE WITH ACETYLENE. E. A. Naragon, R. E. Burk, and H. P. Lankelma, *Ind. Eng. Chem.*, Mar., 1942, pp. 355-58.

RELATION OF PAINT PROPERTIES TO SURFACE AREAS OF CARBON BLACK. O. J. Brown, Jr., and W. R. Smith, *Ind. Eng. Chem.*, Mar., 1942, pp. 352-55.

CURING RATE OF RUBBER: Effect of Phosphate Buffer Mixture on Rate of Cure of Crepe Rubber. E. B. Newton, *Ind. Eng. Chem.*, Mar., 1942, pp. 374-78. Evaluation of the Buffer Capacity of Crude Rubbers. E. B. Newton, E. A. Willson, pp. 378-82.

VINYLIDENE CHLORIDE POLYMERS. W. C. Goggin and R. D. Lowry, *Ind. Eng. Chem.*, Mar., 1942, pp. 327-32.

EFFECTS OF LOW TEMPERATURE ON NEOPRENE VULCANIZATES. F. L. Yerzley and D. F. Fraser, *Ind. Eng. Chem.*, Mar., 1942, pp. 332-36.

COLLOIDAL CARBON AS REVEALED BY THE ELECTRON MICROSCOPE. W. B. Wiegand, and W. A. Ladd, *Rubber Age (N. Y.)*, Mar., 1942, pp. 431-36.

RUBBER SHORTAGE PUTS MAIN STREET BACK ON THE MAP. E. E. Sproul, *Dom. Commerce*, Mar. 12, 1942, pp. 9-10.

SYNTHETIC COATINGS. H. O. P. Clipper, *Paint, Oil, Chem. Rev.*, Feb. 26, 1942, pp. 11-14, 38-39, 51-52. (Conclusion.)

"FAIRPRENE" IMPROVES AIRPLANES. *Du Pont Magazine*, Mar., 1942, p. 13.

SUMMARY OF TREADING. *Tire Rebuilders News*, Feb., 1942, pp. 6-7.

FIRST COMPLETE DETAILS ON TREADING RATIONING. *Tire Rebuilders News*, Feb., 1942, pp. 14-24, 25.

SURVEY OF RUBBER NEEDS IN ATHLETIC GOODS BEING MADE. *Sporting Goods Dealer*, Feb., 1942, pp. 40-41, 46.

PROCESSING SYNTHETIC RUBBER. *Chem. & Met. Eng.*, Feb., 1942, p. 113.

PERBUNAN RUBBER. *Product Eng.*, Mar., 1942, pp. 163-64.

Amendment No. 2

(*Continued from page 50*)

Type of Service	Operating Voltage	Compounds for Insulation	Jacket	Outer Covering
(1) Building wire and general service in dry locations.	0-3000	C	None	Fibrous or lead
	3001-5000	C	None	Lead
	3001-5000*	B	None	Fibrous
	5001 and over	B	None	Fibrous or lead
(2) For general service in wet or damp locations..	3001 and over	B	None	Lead or impervious sheath
	Any	A	None	Fibrous
(3) For general service at copper temperatures above 60° C., motor leads, and for severe mechanical conditions	Any	A	None	Fibrous, lead or impervious sheath
(4) Portable heavy-duty service of the following kinds only: (i) Electric power shovels and dredges (ii) Mining locomotives and machinery (iii) Welding machinery and power leads (iv) Portable drills and tools (v) Electrically driven construction machinery, including air compressors, cement mixers, conveyers, hoists, cranes, locomotives, and public conveyances (vi) Oil well exploration cable	0-5000	B	D	
(5) Portable appliance service cords	0-600	C	None	Fibrous
(6) Automotive ignition cable.	Any	F	None	Fibrous

Provided that compound (D) may be used as a jacket in the manufacture of three-conductor type POSJ-32 cord for use in lengths not exceeding one foot between wetproof electric heating pads and heat control switches; and provided further that compound C may be used as a jacket in the manufacture of type PWP cord.

(7) Compounds used for manufacturing cable tape shall contain no Rubber and not more than 80% by volume of Reclaimed and Scrap Rubber, and shall be applied only to one face.

(8) No Rubber, Latex, or Reclaimed and Scrap Rubber shall be used as insulation on the neutral wire of a grounded neutral system.

(9) Rubber jackets, belts, or sheaths shall not be used in wire or cable except as provided in Section (4) above.

Patents and Trade Marks

APPLICATION

United States

2,268,306. **Vibration Dampening Device** Having an Elastic Buffer Element Encased in an Elastic Housing. T. Sarti, Milan, Italy.

2,268,312. **Pneumatic Tire** with Pressure Indicator, Comprising a Sidewall with an Outer Ply Having an Opening Formed therein and an Inner Ply Bearing a Color Indication So Arranged As to Be Brought into Alinement with the Opening on Bending of the Tire Wall on a Change of Internal Air Pressure from Normal to Abnormal. E. S. Stanton, assignor of one-half to A. J. Moran, both of Brooklyn, N. Y.

2,268,321. **Catheter.** V. J. Flynn, Palisades Park, assignor to Wardlyn Corp., Ridgefield, both in N. J.

2,268,329. **Dual-Wheel Braking Means** Having a Resilient Container Located between the Wheels and Expansible by Fluid Pressure. C. S. Ash, Milford, Mich.

2,268,344. **Pneumatic Tire Tread** Comprising a Carcass of Strain-Resisting Elements and a Tread of Rubber Composition with a Plurality of Diagonally Disposed Ridges Formed in the Rubber Composition at the Bases of at Least Some of the Grooves. A. Shesterkin, Grosse Pointe Park, Mich., assignor, by mesne assignments, to United States Rubber Co., new York, N. Y.

2,268,370. **Inner Tube** with Multiple Air Chambers. J. A. H. Berkeij, Altadena, Calif.

2,268,385. **Hose Coupling,** for Securing High-Pressure Flexible Hose to Well Drilling Apparatus, Having a Yieldable Sealing Element. E. S. Davis, Newton, Conn., and J. H. Reynolds, Poughkeepsie, assignors to New York Rubber Corp., New York, both in N. Y.

2,268,399. **Knitted, Run-Resisting, Bathing Garment Fabric** of Laminated Elastic Sheet Material Comprising Fabric Adhesively Secured to a Rubber Sheet. V. H. Hurt, Cranston, R. I., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,268,415. **Paint Composition** Comprising a Chlorinated Isobutylene Polymer, a Drying Oil, and a Pigment. A. J. Morway, Roselle, and F. L. Miller, Roselle Park, both of N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,268,435. **Shoe and Foot Saver** Comprising a Metallic Housing Having an Instep-Toe Portion and a Sole Portion, a Rubber Strip Disposed across the Instep Portion and a Second Strip around the Toe Portion. V. Zucker, Omaha, Nebr.

2,268,439. **Railway Vehicle Suspension** with Rubber Torsion Bushings. J. D. Beebe, Silver Lake, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,268,459. **Card Cloth Foundation** Which Consists of a Layer of Weftless Stretch-Resisting Cords and a Carrying Strip of Woven Fabric to Which the Cords Are Firmly Bonded by an Adhesive. H. C. Murray, Providence, R. I., assignor to United States Rubber Co., New York, N. Y.

2,268,462. **Dispensing Tubes** for Aqueous Substances Comprising a Tube Body of Cellulosic Material Slightly Parchmentized and Treated with an Aqueous Dispersion Comprising Polymerization Products, Organic Rubber, or Artificial Rubber, and Then Coated with a Film of Varnish. G. Sachsenröder and A. Brossette, both of Wuppertal-Barmen, Germany.

2,268,509. **Clutch** Having an Annular Fluid Tight Chamber with Expansible Walls. H. T. Kraft, assignor to General Tire & Rubber Co., both of Akron, O.

2,268,644. **Shoelace Lock Device** Constituted of Rubber-Like Elastic Material. A. O. Dahlberg, New York, N. Y.

2,268,729. **Making a Box Toe** by Impregnating a Fibrous Web with a Mixture of a Hydraulic Setting Cement and a Rubber Dispersion, Treating the Web with a Coagulating Agent, and Lasting It in the Toe of a Shoe. W. B. Tucker, Lancaster Township, assignor to Armstrong Cork Co., Lancaster, both in Pa.

2,268,740. **Neck Duster Brush** with a Bulb and a Powder Reservoir. D. Cory, Dousman, Wis.

2,268,809. **Woven Elastic Fabric.** L. de Roon, Ridgewood, N. J., assignor to Blue Bird Silk Mfg. Co., Inc., New York, N. Y.

2,268,818. **Full-Fashioned Stocking** Having an Elastic Panel Embodying Rubber Thread Secured in the Upper Portion. I. A. Goodman, assignor to National Silk Hosiery Mills, Inc., both of Indianapolis, Ind.

2,268,942. **Door Check** with Resilient Means Yieldingly Urging Bearings into Engagement with a Pair of Spring Arms. R. C. Jacobs, Detroit, Mich.

2,268,994. **Syringe Ampoule** with Rubber Closure Cap. A. E. Smith, Los Angeles, Calif

2,269,003. **Multiple-Cell Tire Tube** Comprising an Inner Tube Arranged Concentrically to an Outer Tube, an Air Hose Substantially Concentrically Mounted in the Inner Tube, the Space between Inner Tube and Outer Tube Being Divided into Cells. M. N. Bonsiakos, San Francisco, Calif.

2,269,103. **Gyroscopic Instrument** with a Multipart Ball Bearing Having a Rubber Layer. W. G. Harding, Whitton, and R. H. Nisbet, Osterley, both in England, assignors to Sperry Gyroscope Co., Inc., Brooklyn, N. Y.

2,269,223. **Nursing Nipple** with Projecting Finger-Gripping Tabs. C. R. Porthouse, Kent, and W. B. McIntosh, Akron, assignors to Pyramid Rubber Co., Ravenna, all in O.

2,269,230. **Insulated Electrical Conductor** Having a Continuous Insulation Comprising the Product of Vulcanizing a Composition (70 to 85% by Weight of Rubber, a Reaction Product of Rubber and a Halogen Acid of Tin, and a Vulcanizing Agent) Having Sufficient Rigidity as to Maintain the Conducting Core Accurately Centered during Vulcanization *in Situ* on the Core. M. H. Savage, Bridgeport, and L. H. Hitchcock, Milford, both in Conn., assignors to General Electric Co., a corporation of N. Y.

2,269,244. **Tire and an Inner Tube** with One or More Flexible Annular Partitions Generally Parallel to the Median Plane of the Tube, and a Valve Body Extending through Each Partition. B. B. Berry, Indianapolis, Ind.

2,269,342. **Inflatable Mattress** Comprising Paired Rubber Sheets Vulcanized together to Form a Tufting Zone. J. H. Johnson, Toronto, Ont., Canada, assignor to K & W Rubber Corp., Delaware, O.

2,269,362. **Roller Skate Brake Toe Attachment** Comprising a Hard Rubber Block. J. G. Daniska, Vandergrift, Pa.

2,269,367. **Rubber Valve Stem** for Pneumatic Tires. H. Z. Gora, Bridgeport, Conn., assignor to Jenkins Bros., New York, N. Y.

2,269,419. **Interlocking Slide Fastener,** for a Surgical Stocking, Having a Stringer for Each Row of Links Comprising a Web of Pre-formed Elastic Stretchable Rubber-Like Sheet Material. B. Adler and L. Siegel, both of Brooklyn, N. Y.

2,269,440. **Container Cap** Having a Cushion Liner Comprising Cork Granules and Sulphur-Vulcanized Rubber, the Liner Being Substantially Devoid of Free Sulphur. L. J. De Holczer, assignor to Crown Cork & Seal Co., Inc., both of Baltimore, Md.

2,269,628. **Blackboard** Comprising a Vulcanized Hard Rubber Base with Finely Divided Particles of Mineral Filler Containing Crystalline Silica Distributed therethrough. L. R. Kolovsky, Chicago, assignor to Weber Costello Co., Chicago Heights, both in Ill.

2,269,685. **Rubber Diaphragm** for Connecting Articulated Railway Train Sections, and Having Reenforced Edges to Distribute the Stresses Uniformly throughout the Entire Sheet. W. C. Potthoff, Cuyahoga Falls, assignor, by mesne assignments, to Wingfoot Corp., Akron, both in O.

2,269,712. **Adhesive Sheet** Comprising a Flexible Backing, a Layer of Vulcanized Rubber Resistant to Oils, Organic Solvents, and Water, a Layer of Pressure-Sensitive Adhesive and an Exposed Surface Opposite to the Adhesive Surface, Inactive to the Latter, to Permit Easy Removal from Rolls. R. G. Drew, assignor to Minnesota Mining & Mfg. Co., both of St. Paul, Minn.

2,269,721. **Washing Device** Comprising a Cellular Pad, a Flexible Hose, and a Hand Receiving Element Secured to the Rear Surface of the Pad. A. A. Johnson, Holly, Mich.

2,269,868. **Swim Cap** with Absorbent Sealing Marginal Edge. M. Smith, Houston, Tex.

2,269,931. **Shower Head** with a Flexible Rubber Rim Fitting within an Outer Shell. R. E. Bletcher and E. H. Bucknell, both of Los Angeles, Calif.

2,269,923. **Leather Faced Plied Sheet Material** Having a Fine Closely Woven Elastic Fabric Backing Sheet. A. Vamos, Brooklyn, assignor, by mesne assignments, to United States Rubber Co., New York, both in N. Y.

2,270,088. **Knitted Elastic Selvage.** W. L. Smith, Jr., Pawtucket, assignor to Hemphill Co., Central Falls, both in R. I.

2,270,140. **Flexible Coupling** with a Cylindrical Elastic Element between the Main Members. E. H. Piron, New York, N. Y., assignor to Transit Research Corp., a corporation of N. Y.

2,270,313. **Therapeutic Apparatus** with a Device for Enclosing and Effecting a Seal with an Appendage of a Person. H. T. Kraft, assignor to General Tire & Rubber Co., both of Akron, O.

2,270,336. **Vibration Absorber** Comprising Rubber or Synthetic Rubber of a Plurality of Hardnesses Formed into a Homogeneous Unit to Provide a Hard Core and a Resilient Outer Rim to Make up the Vibration Absorbing Member and also Provided with Means to Correct the Sag Due to the Aging of the Rubber. C. L. Paulus, Dayton, O.

2,270,519. **Rubber Sealing Gasket** for a Bell and Spigot Joint. H. P. Fisher, Wabash, Ind., assignor to General Tire & Rubber Co., Akron, O.

2,270,569. **Coupling Eye** with a Pneumatic Means to Actuate a Throat-Piece. D. S. Weiss, Portland, Oreg.

2,270,571. **Wheel Suspension** with Body of Deformable Torsionally Resisting Material for Yieldingly Resisting Oscillation. H. T. Woolson, Detroit, A. G. Herreshoff, Grosse Pointe, H. A. Hicks, Detroit, and G. H. Parker, Royal Oak, assignor to Chrysler Corp., Highland Park, all in Mich.

2,270,572. **Wheel Suspension** with a Body of Deformable Torsionally Resisting Material for Yieldingly Resisting Oscillation. H. T. Woolson, Detroit, A. G. Herreshoff, Grosse Pointe, H. A. Hicks, Detroit, and G. H. Parker, Royal Oak, and R. A. Wyatt, Detroit, assignors to Chrysler Corp., Highland Park, all in Mich.

2,270,622. **Railway-Car Resilient Wheel,** with Means to Distribute Uniformly Assembly Pressure, Prevent Radial Movement of Wheel Parts, and Eliminate the Transfer of Braking Heat. C. Burton and D. P. Steward, both of Johnstown, Pa., assignors to Carnegie-Illinois Steel Corp., a corporation of N. J.

2,270,650. **Fan Attachment** for Sewing Machines with a Plurality of Flexible Resilient Blades. T. Crocella, New York, and H. Mayer, Bronx, assignors to Amex Associated Exporters & Importers Corp., New York, all in N. Y.

2,270,651. **Rotary Pump Sealing Device** with a Resilient Ring. F. B. Doyle, Phillipsburg, N. J., assignor to Ingersoll-Rand Co., New York, N. Y.

2,270,662. **Sheet Steel** Coated with Film-Forming Ingredients Comprising a Mixture of a Vinyl Resin and a Phenol Aldehyde Resin. M. H. Raney, Long Island City, N. Y., assignor to Anchor Hocking Glass Corp., Lancaster, O.

2,270,673. **Resilient Engine Mounting.** H. C. Lord, assignor to Lord Mfg. Co., both of Erie, Pa.

2,270,702. **Blunt Barb Elastic Holder.** S. Getmansky, New York, N. Y.

2,270,724. **Welding Electrode Holder Construction** Having an Electrode Retainer of Insulating Material. E. Brazitis, St. Clair Shores, and G. Brazitis, Detroit, both in Mich.

Dominion of Canada

401,261. **Printing Machine Inking Mechanism** Having an Inking Roller with a Resilient Surface. American Bank Note Co., New York, assignee of A. A. Wittnebel, New Rochelle, both in N. Y., U. S. A.

401,298. **Cushion Liner** for a Container Closure Comprising Solid Ethylene Polymer Having a Molecular Weight of at Least 6,000, Melting from about 100 to about 200° C., and Having a Crystalline Structure. Canadian Industries, Ltd., Montreal, P. Q., assignee of G. L. Dorough, Wilmington, Del., U. S. A.

401,321. **Protective Goggles** with Rubber Bead. Clement Clarke, Ltd., assignee of C. W. Clarke and P. C. Livingston, co-inventors, all of London, England.

401,326. **Rubber Wiper Blade** for Quill Cleaning Machines. Dayton Rubber Mfg. Co., assignee of H. M. Bacon, both of Dayton, O., U. S. A.

401,332. **Stretchable Leather** Having an Elastic Backing Sheet Secured thereto with a Latex Adhesive. Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of A. Vamos, Brooklyn, N. Y., U. S. A.

401,348. **Composite Roll** for Paper-Making Machines Comprising a Core, a Shell about the Core, and a Covering of Rubber-Like Cushion Material Vulcanized in Place upon the Shell. B. F. Goodrich Co., New York, N. Y., assignee of E. Peterson, Cuyahoga Falls, and A. B. Merrill, Akron, co-inventors, both in O., all in the U. S. A.

401,374. **Vehicle Door Rubber Bottom and Wind Seal.** National Automotive Fibres, Inc., assignee of G. R. Cunnington, both of Detroit, Mich., U. S. A.

401,421. **Rubber Glove** So Curved as to Receive a Partially Clenched Hand without Wrinkling. W. O. Betts, Mile 34½ P.G.E. Railway, B. C.

401,434. **Tire Inflating Device** with a Flexible Rubber Conduit. A. A. Jenne, Topsfield, Mass., U. S. A.

401,441. **Eccentric Internal Gear-Type Pump** with an Annular Gear of Compressible Material Having the Resiliency of Rubber. M. Schmitz, Ferndale, Mich., U. S. A.

401,448. **Railway Car Resilient Wheel.** W. E. Williams, Vancouver, B. C.

401,459. **Vial Closure** with a Rubber Sealing

Member. Aluminum Co. of America, Pittsburgh, assignee of E. E. Hogg, New Kensington, both in Pa., U. S. A.

401,497. **Tire Repair** Consisting of a Filler Plug Entirely of Rubber Adapted to Be Mounted in an Aperture That Extends through the Fabric Plies and Tread of a Pneumatic Tire Casing. Firestone Tire & Rubber Co., assignee of R. F. Wilson, both of Akron, O., U. S. A.

401,550. **Closure Cap** Having a Sleeve Gasket of Elastically Deformable Material. White Cap Co., Chicago, assignee of W. P. White, Glencoe, both in Ill., U. S. A.

401,553. **Electric Plug** with a Body of Resilient Material. Viceroy Mfg. Co., Ltd., assignee of L. J. Clayton, both of Toronto, Ont.

401,630. **Abrasive Coated Article** Having a Layer of Liquid Heat Maturable Adhesive. Carborundum Co., assignee of R. L. Melton and R. C. Benner, co-inventors, all of Niagara Falls, N. Y., U. S. A.

401,631. **Bonded Abrasive Article** Having a Heat Maturable Binder therefor. Carborundum Co., assignee of R. L. Melton and G. L. Chapman, co-inventors, all of Niagara Falls, N. Y., U. S. A.

401,644. **Method of Forming Molds** Which Comprises Vulcanizing in a Mold a Pattern of Rubber Composition, Removing It from the Mold and Increasing the Volumetric Content of the Pattern by the Addition of a Swelling Agent, and Then Electroforming a Layer of Metal on the Increased Rubber Pattern. Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of A. W. Bull, Grosse Pointe, Mich., U. S. A.

401,646. **Cylindrical Torsion-Spring** with Rubber-Like Material Mounted to Resist Rotational Movement by Torsional Stress. B. F. Goodrich Co., New York, N. Y., assignee of A. S. Krotz, Akron, O., both in the U. S. A.

401,647. **Tire Tread** Comprising a Plurality of Ribs Separated by Extending Grooves, a Narrow Rib Being Interposed between Adjacent Wider Ribs. B. F. Goodrich Co., New York, N. Y., assignee of C. F. Ofensend, Akron, O., both in the U. S. A.

401,681. **Brassiere** with a Portion Comprising Plies of Fabric and Non-creasable Rubber Material. A. Stein & Co., Ltd., Toronto, Ont., assignee of C. Bullinger, Riverside, Ill., U. S. A.

401,728. **Form Fitting Panties.** E. Cadous, New York, N. Y., U. S. A.

401,732. **Resilient Sealing Stopper** for Carboys, Bottles, and Cans. W. S. Freeman, Leeds, Yorkshire, England.

401,772. **Electric Switch Handle** Having a Resilient Body. Canadian General Electric Co., Ltd., Toronto, Ont., assignee of F. H. Travers, New Britain, Conn., U. S. A.

401,840. **Light Buoy** Comprising a Pneumatic Rubber Tube and Means to Support a Light. Firestone Tire & Rubber Co., assignee of J. A. Diehl, both of Akron, O., U. S. A.

401,931. **Hat Ventilating Device** Comprising a Band of Rubber-Like Material. L. Davis, Hamilton, Ont.

401,937. **Tubing Resilient Coupling.** G. W. Haury, Lakeland, Fla., U. S. A.

401,971. **Vacuum Container** with Rubber Plug Closure and a Rubber Sealing Disk Extending over the Plug. Baxter Laboratories, Inc., assignee of A. Campbell, both of Glenview, Ill., U. S. A.

402,014. **Metal Paper Making Press Roll** Provided with a Covering Consisting of Layers of Hard Rubber, Softer Rubber, and Fabric. Dominion Engineering Works, Ltd., Lachine, assignee of H. G. Welsford, Westmount, both in P. Q.

402,113. **Sponge Rubber Expansion Joint.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands, assignee of M. G. Shepherd, Waterbury, Conn., U. S. A.

402,114. **Resilient Expansion Joint** Utilizing an Adhesive Formed by Latex Solids. International Latex Processes, Ltd., St. Peter's Port, Channel Islands, assignee of R. R. Sterrett, Naugatuck, Conn., U. S. A.

402,142. **Elastic Seam Tie.** M. Dombrowsky, New York, N. Y., U. S. A.

402,217. **Decorated Composite Fabric** Adapted to Be Tensioned in Use, Comprising a Strip of Rubber Vulcanized to the Rear of the Facing Fabric. National Automotive Fibres, Inc., assignee of C. J. Davies, both of Detroit, Mich., U. S. A.

402,254. **Steel Helmet** with Removable Cushion Tabs. Viceroy Mfg. Co., Ltd., assignee of S. Pegler, both of Toronto, Ont.

Dominion of Canada

402,368. **Resilient Coupling** for Thin-Walled Tubing. Imperial Brass Mfg. Co., Chicago, assignee of R. D. McIntosh, River Forest, both in Ill., U. S. A.

402,372. **Method of Rapidly Setting a Film of Printing Ink** Comprising Pigment Dispersed in a Linseed Oil Vehicle, Which Consists in Impregnating the Ink Film with a Solution of Chlorinated Rubber Dissolved in a Volatile Solvent Miscible with Linseed Oil and Evaporating the Solvent. Interchemical Corp., New York, assignee of A. J. Pingarron, Woodside, L. I., both in N. Y., U.S.A.

402,395. **Pneumatic Mattress.** Sampson Rubber Products Corp. of Delaware, assignee of R. W. Sampson, both of New York, N. Y., U. S. A.

402,431. **Medicinal Applicator.** J. P. Robinson, Tokyo, Japan.

402,471. **Massage Device** Comprising a Compressible Bulb and an Open-End Suction Head. H. E. Niemiec, Miami, Fla., U. S. A.

402,507. **Pneumatic Tire Tread** Provided with a Plurality of Isolated, Rectilinear Slits Progressively Brought into Engagement with the Ground, the Closed Leading End of Each Slit Coming into Contact with the Ground before the Closed Trailing End of the Preceding Adjacent Slit Leaves Contact with the Ground. Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of G. G. Havens, Detroit, Mich, U. S. A.

United Kingdom

542,142. **Shock-Absorbers.** Automotive Products Co., Ltd., and P. W. Thornhill.

542,349. **Knitted Asbestos Fabrics.** United States Rubber Co.

542,379. **Reenforced Plastic Materials.** W. Y. Jones.

542,473. **Electric Power Cables.** J. S. Mollerhoj.

542,506. **Foot- and Like Game-Balls.** W. Sykes, Ltd., and W. J. Wycherley.

542,825 **Abrasive Bodies and Bond Mixtures therefor.** Norton Grinding Wheel Co., Ltd.

542,870. **Girdles.** M. N. Burke.

PROCESS

United States

2,269,377. **Producing Unvulcanized Crepe Rubber Soling** by Preparing a Master Batch from Unmilled Crepe Rubber and Silica Aerogel, Adding Unmilled Unvulcanized Crepe Rubber in Such Amount that the Composition Contains from 2 to 10% of Aerogel, Completing the Milling at a Low Temperature and in a Minimum of Time Required to Attain a Homogeneous Composition. M. Omansky, Brookline, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,269,660. **Method of Preventing the Adhesion of Tacky Unvulcanized Rubber** at Ordinary Temperatures Which Comprises Applying a Solution of Resin (Coumarone and Indene, or Mixtures thereof), Evaporating the Solvent to Deposit on the Rubber a Continuous Film Consisting Solely of the Resin. G. E. Griffin, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,269,661. **Laminated Dispensing Tube.** I. Gurwick, assignor to Shellmar Products Co., both of Mount Vernon, O.

2,270,285. **Making an Impregnated Fabric** Which Comprises Charging the Fabric with a Mixture of Isobutylene and Butadiene and Treating It with a Friedel-Crafts Type of Catalyst at a Temperature below −10° C., Thereby Polymerizing the Mixture to a High Molecular Weight Polymer in the Interstices of the Fabric. P. K. Frolich, Westfield, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,270,731. **Rubber Cement** Comprising a Solution of Rubber in a Volatile Solvent, the Rubber Being Incorporated with about 3 to 10% by Weight of a Water Swollen Powdered Colloidal Material to Render the Composition Sprayable without Cobwebbing. E. O. Groskopf, Rutherford, N. J., assignor to Patent & Licensing Corp., New York, N. Y.

2,271,058. **Manufacture of Rubber Cushioning Material** Which Comprises Applying a Textile Web to a Moving Conveyer Band with a Corrugated Surface, Applying a Latex Foam to the Web, Leveling the Upper Surface of the Foam and Passing the Coated Textile through a Heated Chamber to Coagulate the Foam. W. Binns, Bradford, assignor of one-half to Bintex, Ltd., Leeds, Yorkshire, both in England.

2,271,101. **Producing a Smoothly Lying and Closely Woven Elastic Fabric** from Stretched and Unvulcanized Rubber Thread. T. L. Shepherd, Portslade, England, assignor to Clark Thread Co., a corporation of N. J.

2,271,102. **Woven Elastic Fabric.** T. L. Shepherd, Portslade, England, assignor to Clark Thread Co., a corporation of N. J.

2,271,458. **Rubber Impregnated and Coated Web.** E. Lionne, Lynn, Mass.

2,271,498. **Closed-Cell Cellular Hard Rubber** with Cells Containing Hydrogen Sulphide Gas and Substantially Free from Other Gases. R. L. Overstreet, Bedford, Va., assignor to Salta Corp., Jersey City, N. J.

2,271,865. **Assembling Rubber Filaments into Thread.** R. G. James and S. F. Smith, Wylde Green, both of Birmingham, assignors to Dunlop Rubber Co., Ltd., London, all in England.

2,272,254. **Flexible Printing Plate.** H. Swan, Upper Montclair, N. J., assignor, by mesne assignments, to Bakelite Corp., a corporation of N. J.

2,272,289. **Pneumatic Cushions.** C. L. Beal, Cuyahoga Falls, assignor to American Anode, Inc., Akron, both in O.

2,272,290. **"Tufted" Hollow Rubber Article.** C. L. Beal, Cuyahoga Falls, assignor to American Anode, Inc., Akron, both in O.

Dominion of Canada

420,347. **Manufacturing at the Same Time and As an Integrated Unit a Tire Tube and a Rubber Valve Stem therefor.** Dill Mfg. Co., Cleveland, assignee of A. E. Bronson, Shaker Heights, both in O., U. S. A.

402,456. **Making Pneumatic Rubber Insole Material** by Preparing a Thick, Flexible Base Element Having Pockets Extending Inwardly from One Surface, Expanding a Smaller, Thin, Rubber Sealing Element by Immersion in Gasoline until It Is Substantially the Same Size as the Base Element, Cementing the Expanded Element to the Base Element to Form Air Cells, Whereby, upon Evaporation of Gasoline, the Sealing Element Will Be Normally under Tension. C. V. McGuire, Grosse Pointe Park, Mich., U. S. A.

402,481. **Composite Floor Mats** Comprising a Sheet of Pile Fabric on Vulcanizable Stock United under Heat and Pressure without Matting the Fabric Pile. Baldwin Rubber Co., assignee of D. F. Collins, both of Pontiac, Mich., U. S. A.

402,517. **Macroporous or Cellular Rubber.** Firestone Tire & Rubber Co., Akron, O., U. S. A., assignee of Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont., assignee of H. W. Greenup, Akron.

402,518. **Reenforced Rubberized Fabric** for Tire Carcasses. Firestone Tire & Rubber Co., Akron, O., U. S. A., assignee of Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont., assignee of H. L. Swain, Cuyahoga Falls, O.

402,520. **Preparing Crude Rubber** by Coagulating Extremely Dilute *Hevea* Latex with an Organic Acid, Insolubilizing the Proteins in the Coagulum by Heating, and Exhaustively Extracting It with Water before Drying. B. F. Goodrich Co., New York, N. Y., U. S. A., assignee of E. B. Newton, Kuala Lumpur, Federated Malay States.

402,539. **Uniformly Plasticizing Rubber** by Placing Crude Rubber in a Closed Chamber, Admitting Air until a Pressure of 300 Pounds per Square Inch Is Reached, Raising the Temperature of the Rubber to about 260° F., and Maintaining Temperature and Pressure about 30 Minutes. Rubatex Products, Inc., New York, N. Y., assignee of L. Cooper, Milford, Conn., both in the U. S. A.

402,573. **Making Sponge Rubber** by Liberating Hydrogen from a Fluid Latex Composition Containing an Alkali Metal Hydroxide by Interaction of Aluminum to Form Uncoagulated Latex Foam, Converting the Foam into Desired Shape, and Heating to Coagulate the Latex to Form Rubber Sponge. International Latex Processes, Ltd., St. Peter's Port, Channel Islands, assignee of A. Schwerdle, Chatham, N. J., and C. D. Mason, Mishawaka, Ind., both in the U. S. A.

402,678. **Producing Containers from Sheets of Rubber Hydrochloride Material** by Cutting a Sheet into Container Blanks, Stacking together a Plurality of Blanks with the Alined Edges Thermally Insulated, and Subjecting the Edges to Heat to Produce a Thermoplastic Union between the Edges of the Individual Blanks. Shellmar Products Co., assignee of I. Gurwick, both of Mt. Vernon, O., U. S. A.

United Kingdom

542,091. **Concentrating Latices of Rubber and Rubber-Like Substances** Such As Gutta Percha and Balata. Revertex, Ltd., and S. Austen.

542,109. **Purified Latex and Rubber therefrom.** Rubber-Stichting.

542,313. **Elastic Yarn.** United States Rubber Co.

542,551. **Footwear.** Dunlop Rubber Co., Ltd., and R. C. Davies.

MACHINERY

United States

2,269,650. **Apparatus to Measure Endless Belts and Other Flexible Elongated Articles.** J. M. Cooney, Cincinnati, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,269,658. **Valve Buffer and Polisher.** E. D. George and H. M. Brown, both of Cuyahoga Falls, O., assignors to Wingfoot Corp., Wilmington, Del.

2,269,758. **Molding and Curing Press** Adapted to Remove Molded Articles without Removing the Molds. J. de Noronha, New York, N. Y.,

assignor to De Noronha Rubber Products Corp., New Brunswick, N. J.

2,270,119. **Tire Buffer.** J. Green, Norfolk, Va.

2,270,657. **Horizontal Wheel Balancer.** H. T. Kraft, assignor to General Tire & Rubber Co., both of Akron, O.

2,270,817. **Vulcanizing Press** Having Separable Mating Mold Sections Provided with Means to Tilt so as to Facilitate Emptying and Loading the Press. R. W. Allen, assignor to Firestone Tire & Rubber Co., both of Akron, O.

Dominion of Canada

402,118. **Tire Building Machine.** L. Herbert, Frankfurt a.M., and A. Frohlich, Hamburg, co-inventors, both in Germany.

402,171. **Extensometer.** Callender's Cable & Construction Co., Ltd., assignee of A. V. Howson and N. S. Reed, all of London, England.

402,189. **Tire Tread Slitter.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of G. F. Wikle, Ann Arbor, Mich., U. S. A.

402,248. **Skiving Machine.** United Shoe Machinery Co. of Canada, Ltd., Montreal, P. Q., assignee of E. J. Ray, Beverly, Mass., U. S. A.

402,304. **Vulcanizer** for Continuous Strip Stock Processing. A. L. Wallace, Northport, N. Y., U. S. A.

United Kingdom

541,304 and 541,305. **Apparatus for the Electrical Treatment of Colloidal Dispersions.** Dunlop Rubber Co., Ltd., E. A. Murphy, F. J. Paton, and J. Ansell.

541,289. **Apparatus and Method for the Production of Foamed Aqueous Dispersions of Rubber, Etc.** United States Rubber Co.

541,466. **Apparatus to Make Interlocking Members** for Sliding-Clasp Fasteners. United States Rubber Co.

CHEMICAL

United States

2,268,418. **Antiager** for Rubber Comprising a Reaction Product of a Dialkyl Ketone and an N-Alkyl Diarylamine. P. T. Paul, Naugatuck, Conn., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,268,419. **Antioxidant**—1-Nitroso-2,2,4-Trialkyl-1,2 Dihydro Quinoline. P. T. Paul, Naugatuck, Conn., assignor to United States Rubber Co., New York, N. Y.

2,268,501. **Vulcanization of Rubber** Containing a Sulphur-Bearing Accelerator and the Fusion Product of a Diaryl Guanidine and a Diterpene-Maleic Anhydride Addition Product. T. F. Bradley, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,268,524. **Vulcanization of Rubber Mix** Containing a Sulphur-Bearing Accelerator and the Fusion Product of a Diaryl Guanidine and a Monoterpene-Maleic Anhydride Addition Product Acid. A. R. Davis, Old Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,269,472. **Vulcanization of Rubber** Containing a Combination of Primary Accelerator (2-Mercapto-Thiazoline and Carbon Substituted 2-Mercapto-Thiazolines in Which the Substituents are Alkyl or Hydroxyalkyl Groups) and Secondary Accelerator (Aldehyde-Amines or Aryl Guanidines). A. M. Neal, Wilmington, Del., and B. M. Sturgis, Pitman, N. J., assignors to E. I. du Pont de Nemours & Co., Wilmington, Del.

2,269,810. **Resinous Copolymer of Styrene** with a Nuclear Alkylated Styrene. R. R. Dreisbach and S. M. Stoesser, assigners to Dow Chemical Co., all of Midland, Mich.

2,269,990. **Composition** Comprising Polyvinyl Halide and a Methyl Chlor Stearate Having at Least 3 Chlorine Atoms in the Molecule. M. M. Safford, Schenectady, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,270,052. **Producing Polymers of Isobutylene** Not Higher in Molecular Weight Than Tetraisobutylene Which Comprises Contacting Diisobutylene with Anhydrous Ferric Chloride at a Temperature of about 150 to 300° F. E. M. Hattox, Baton Rouge, La., assignor to Standard Oil Development Co., a corporation of Del.

2,270,182. **Manufacture of Purified Vinyl Aromatic Resins in Powdered Plasticized Form.** W. R. Collings, G. P. Schmelter, and F. E. Dulmage, assignors to Dow Chemical Co., all of Midland, Mich.

2,270,184. **Purifying Vinyl Aromatic Resins.** R. R. Dreisbach, assignor to Dow Chemical Co., both of Midland, Mich.

2,270,257. **Preparation of Dixanthogens.** G. L. Browning, Jr., Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,270,706. **Dyeing Vinyl Polymer Yarns, Etc.,** in a Dye Bath Containing a Suspension Dyestuff in the presence of 8-Hydroxyquinoline. K. Heymann, Meadville, Pa., assignor to American Viscose Corp., Wilmington, Del.

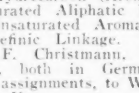
2,270,930. **Purified Cyclorubber Derivatives.** H. J. Cameron, assignor to Marbon Corp., both of Gary, Ind.

2,270,959. **Stabilizing Synthetic Rubber Materials** by Incorporating in a Synthetic Latex (Emulsion Polymerization Products of Butadienes-1,3, and Other Copolymerizates) a Small Amount of Condensation Products of Hydroxy Compounds (Phenols or Naphthols with an Organic Carbonyl Compound), the Condensation Products Effecting Precipitation of the Latex. H. Murke, Leverkusen-Schlebusch, and W. Becker, Cologne, assignors to I. G. Farbenindustrie A.G., Frankfurt a.M., all in Germany.

2,271,093. **Producing a High Molecular Weight Substance** from the Reaction of a Halogen Derivative of a Hydrocarbon (Aromatic Hydrocarbon or Saturated Aliphatic Hydrocarbons) with an Unsaturated Aromatic Compound Having Olefinic Linkage. M. Pier, Heidelberg, and F. Christmann, Ludwigshafen-on-the-Rhine, both in Germany, assignors, by mesne assignments, to W. E. Currie, New York, N. Y.

2,271,122. **Vulcanizing Rubber** by Heating It and Sulphur in the Presence of an Amino Methylene Imide of an Organic Dicarboxylic Acid Containing at Least Four Carbon Atoms. M. W. Harman, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,271,123. **Vulcanizing Rubber** in the Presence of a N,N'-Polythioamine and an Accelerator of Vulcanization Containing the Group



P. C. Jones, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,271,636. **Process for Preparing High Molecular Weight Plastic Solid Polymerization Products,** Soluble in Hydrocarbon Oils and Capable of Improving the Viscosity-Temperature Characteristics of Lubricating Oils When Blended therewith, Which Comprises Treating with a Halide Polymerizing Agent a Fraction Consisting of a Mixture of Hydrocarbons Boiling in the Range of Butanes and Butenes and Which Contains a Substantial Amount of Isobutylene. P. K. Frolich, Roselle, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,271,782. **Vulcanization of Rubber** in the Presence of an Active Accelerator of the Acidic Type and as an Activator therefor a Primary 2-Amino Thiazole. A. W. Sloan, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,271,834. **Treating Mercaptothiazoles with Ammonia Derivatives.** E. L. Carr, assignor to Firestone Tire & Rubber Co., both of Akron, O.

Dominion of Canada

402,352. **Polymeric Rubber-Like Derivative of Chloro-2-Butadiene-1,3,** Having in Chemical Combination with It about 3% of Sulphur Dioxide, Based on the Weight of the Derivative. E. I. du Pont de Nemours & Co., Inc., assignee of H. W. Starkweather, both of Wilmington, Del., U. S. A.

402,503. **Dispersion of Rubber and Wax in Water** in the Presence of a Morpholine Soap. Dispersions Process, Inc., New York, N. Y., assignee of D. E. Fowler, Naugatuck, and J. F. Zemaitis, Waterbury, co-inventors, both in Conn., all in the U. S. A.

402,506. **Antioxidant**—Composite Reaction Product of a Dialkyl Ketone with an N-Alkyl Diarylamine Compound. Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of P. T. Paul, Naugatuck, Conn., U. S. A.

402,509. **Making Strong and Tough Artificial Resins** by Conjointly Polymerizing a Vinyl Chloride and a Vinyl Acetate in the Presence of a Substance Having at Least Two Olefinic Double Bonds, Which Is Free from Conjugated Pairs of Olefinic Double Bonds and Cross Conjugated Double Bonds, the Substance Having from Four to Ten Carbon Atoms in Its Molecule. Carbide & Carbon Chemicals, Ltd., Toronto, Ont., assignee of W. M. Quattlebaum, Charleston, W. Va., U. S. A.

United Kingdom

542,140. **Compositions Derived from Polymers of Ethylene.** C. L. Child, B. J. Habgood, and Imperial Chemical Industries, Ltd.

542,141. **Heat-Stable Compositions** Containing Vinyl Chloride Polymers. J. R. Lewis, L. B. and W. M. Morgan, and Imperial Chemical Industries, Ltd.

542,204. **Preparation of Crude Rubber.** H. G. C. Fairweather, (B. F. Goodrich Co.).

542,216 and 542,217. **Antioxidants.** United States Rubber Co.

542,305. **Chlorinated Rubber.** Raolin Corp.

542,331. **Adhesive Compositions.** International Latex Processes, Ltd.

542,414. **Derivatives of Hydrocarbons of High Molcular Weight.** Imperial Chemical Industries, Ltd., (E. I. du Pont de Nemours & Co., Inc.).

542,432. **Enlarging and Softening Sponge Rubber and the Products Obtained thereby.** United States Rubber Co.

542,434. **Polymerization of Butadienes-1,3.** A. Carpmael, (I. G. Farbenindustrie A. G.).

542,505. **Heat-Stable Compositions Containing Vinyl Chloride Polymers.** J. R. Lewis, L. B. and W. M. Morgan, and Imperial Chemical Industries, Ltd.

542,895. **Purified Latex and Rubber.** British Rubber Producers' Research Assn., (Rubber Research Station).

542,897. **Expanded Cellular Rubber or the Like.** Jicwood, Ltd., and J. L. M. S. Banks.

UNCLASSIFIED

United States

2,271,064. **Nursing Nipple-Applying Tool.** E. A. Dolph, Newburgh, N. Y.

2,272,130. **Tire Track Forming Shovel.** J. Pauly, Springfield, Mass.

2,272,143. **Portable Ventilation Duct** for Refrigerator Cars. H. M. Wigney, Bronxville, N. Y., assignor to Union Asbestos & Rubber Co., Chicago, Ill.

2,272,548. **Valve** for a Dual-Chambered Tire. C. C. Creamer, St. Paul, Minn.

2,272,781. **Means for Indicating the Degree of Pressure in Pneumatic Tires.** C. G. Stone, Mt. Vernon, N. Y., and H. F. Herbig, Galion, O.

2,272,885. **Seat Construction.** A. E. Rathbun, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,272,889. **Wheel Structure.** W. S. Brink, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,272,899. **Radioactive Compositions.** J. N. Street, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,272,961. **Dual-Wheel Change-over Unit.** W. S. Brink, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,272,962. **Split Wheel** for a Pneumatic Tire. J. W. Tatter, Akron, O., and B. H. Shinn, Butler, Pa., assignors to Firestone Tire & Rubber Co., Akron.

2,272,965. **Vulcanizer Clamp.** J. C. Crowley, Cleveland Heights, assignor to Dill Mfg. Co., Cleveland, both in O.

Dominion of Canada

402,361. **Cord** for Tires, Belts, Etc. B. F. Goodrich Co., New York, N. Y., assignee of C. C. Cadden, Akron, O., both in the U. S. A.

402,417. **Tire Deflation Signaling Device.** H. G. Henry, King City, inventor, and W. Chester Barry, Soledad, assignee of one-half the interest, both in Calif., U. S. A.

402,491. **Improved Pigment** Containing in Suspension Titanium Pigment and Hydrated Oxides of Aluminum and Chromium. Canadian Industries, Ltd., Montreal, P. Q., assignee of D. H. Dawson, Linthicum Heights, Md., U. S. A.

United Kingdom

539,908. **Tool** for Use in Stretching Rubber Tubing. E. Siegrist and W. G. Phillips.

542,499. **Means for Removing Adherent Mud** or Other Foreign Matter from Tires. F. Gaye.

542,910. **Testing the Inflation of Aircraft Tires.** Dunlop Rubber Co., Ltd., and H. R. Fletcher.

TRADE MARKS

United States

392,828. **Parafab.** Rubberized fabrics. Haartz-Mason-Grower Co., Watertown, Mass.

392,853. **Kohinoor.** Belts. B. F. Goodrich Co., New York, N. Y.

392,858. **Youth Is Our Specialty.** Wearing apparel. Best & Co., Inc., New York, N. Y.

392,859. **Super-Wear.** Heels and soles. Hagerstown Rubber Co., Hagerstown, Md.

392,861. **All-American.** Dress shields. I. B. Kleinert Rubber Co., New York, N. Y.

392,863. **Joyce.** Footwear. Joyce, Inc., Pasadena, Calif.

392,880. **An Amelia Ames Fashion.** Clothing. Amelia Ames, Inc., New York, N. Y.

392,976. Representation of an inner tube between the words: **"Tug War."** Tube patches. International Distributors, Memphis, Tenn.

392,992. **Commodore.** Tire casings. B. F. Goodrich Co., New York, N. Y.

FROM OUR COLUMNS

50 Years Ago—April, 1892

The first definite step in the organization of rubber-shoe manufacturers was the filing of articles of incorporation under the laws of New Jersey on March 30. [Excerpts follow]. "The name assumed to designate such Company is United States Rubber Company. The object for which the said Company is formed are the making, purchasing and selling rubber boots and shoes and all materials entering into the manufacture of any and all such goods. The total amount of the Capital Stock is $50,000,000. The period at which the said Company shall commence shall be the 30th day of March, 1892, and the said Company shall terminate on the 30th day of March, 1942." (p. 193).

One of the undeveloped sources of wealth in Mexico is the planting of India-rubber trees. The supply of rubber in the accessible regions of the world is diminishing while the demand for it is largely on the increase. Practical experiments in the cultivation of these trees, according to the official reports of the Bureau of Agriculture, have demonstrated that this industry can be established with profit. (p. 207).

The cultivation of rubber trees is to be tried in the everglades of Florida under the direction of the Department of Agriculture. Experiments are now being made at Lake Geno with seeds and plants obtained from Brazil. The vast region of swamp is presumably capable of producing enough rubber to supply the world. (p. 208).

It is not impossible for a solidly organized commercial company to gain absolute control of the cream of the rubber forests. Only organized modern business methods are necessary to insure economical gathering of a commodity which grows without cultivation. (p. 209).

25 Years Ago—April, 1917

At a meeting of the Scrap Rubber Division [National Association of Waste Materials Dealers] held March 20 it was voted that the Rubber Association of America, Inc., be requested to have a committee meet the Classification Committee of this division for the purpose of drawing up specifications of scrap rubber standard for the trade. (p. 384).

[Chemical Patents] Caoutchouc-Like Material. A caoutchouc-like body resulting from the reaction caused by adding dichloride of sulphur to a mixture containing a ketone capable of yielding isoprene and caoutchouc. (Herman Stern, Munich, Germany, United States Patent No. 1,218,713.) (p. 388).

In practically all processes for reclaiming rubber from tires the fabric is destroyed. In these days of conservation, the recovery of the fabric as well as the rubber is worth consideration. (p. 398).

The competition of Eastern rubber is one of the gravest questions which Brazil is today called upon to face. The tremendous increase in the production of plantation gum and its steadily diminishing cost of production places this country [Brazil] in the position which necessitates a similar decrease in the expense of gathering and forwarding this country's product. (p. 420).

LETTERS FROM OUR READERS

EDITOR: The manifold possibilities of a Rubber Research Institute have been clearly presented by A. T. McPherson, in his article, "A Central Organization for Fundamental Research on Rubber," in the December, 1941, issue of INDIA RUBBER WORLD (pp. 255-58). The value to be derived from fundamental research performed in a well-equipped central laboratory under proper direction certainly would be great. There are a few possible faults in a plan of this type, however, which have not been pointed out in this or previous articles on the subject. While a considerable number of research men, both from industry and the universities, would be attracted by the opportunity to do fundamental work in an institute of this type, a certain hardship would be worked upon research men who elected to remain in industrial or government laboratories. For example, many industrial research men, though largely occupied with applied work, derive considerable value from the occasional fundamental problems which they have the opportunity of pursuing. In fact such fundamental work serves as an important incentive for continued work of the applied type. Thus great care would be required in selecting personnel for the Institute in order to prevent complete cessation of fundamental research in industrial laboratories and thereby a decline in the quality of applied research.

As urged in your editorial in the same issue, the time to start a program of this sort is unquestionably *now*. Familiarity with the demands now being made by the war effort upon our industrial rubber research laboratories leads me to question the desirability and possibility of diverting the best industrial research ability from this most vital field of applied work. Certainly, pure research should be continued, and even accelerated, at this time, but the slightest interruption in industrial war development should be carefully avoided.

It might be argued that a group of university scientists, not now working on war problems, might be organized as a nucleus for a future Rubber Research Institute. In my opinion this procedure would be very ill advised. Neither university nor former industrial scientists should predominate in an organization of this type. Its major objective should be inspiration toward more fundamental research on rubber, both in industrial and university laboratories. It would appear that this objective might be better accomplished through a government-subsidized laboratory, expressly created to pursue fundamental research with rubber. The function of testing rubber products for government procurement agencies should not be included as is now the case with the National Bureau of Standards. It would appear desirable to set up a Board of Control, consisting of industrial research executives as well as university scientists, for selection of the general research program. Thus it might be possible to secure cooperation of industry and, at the same time, maintain research along purely fundamental lines. The very existence of the emergency in rubber now being experienced seems to be an excellent argument for immediate establishment of a government function of this sort. Unfortunately I must admit that I do not know where the necessary personnel could be found for the organization under the present emergency conditions. In my opinion, because of the fact that we are faced with developing an entirely new material, and must also develop a very different processing technique for it as well as new methods of evaluation, there will be a still greater need of technical men in the rubber industry than there has been in the past and at present.

Finally, I should like to point out that I do not wish my somewhat negative remarks to be interpreted as meaning that I am not sympathetic with the program proposed by Dr. McPherson and others. I simply feel that these adverse factors should be considered as well as the large number of advantages which may accrue.

"A RESEARCH MAN OF
THE RUBBER INDUSTRY"

Akron, O.

Synthetic Fatty Acid

PALMALENE, a synthetic palm fatty acid of medium titre, is commercially available from the Beacon Co., 89 Bickford St., Boston, Mass. This synthetically made product is reportedly suitable for use in rubber compounding, alkyl resins, textile specialties, pulp and paper manufacture, and other processes. The saponification number of Palmalene is 180-185; the iodine value, 55-60; and the titre, 35.

Market Reviews

RUBBER SCRAP

DEMANDS for scrap rubber continued at recent record levels in March. Collections were reportedly very light, and the reason advanced by dealers generally was the reluctance of the 28 to 32 million car owners to discard worn tires and tubes. In an effort to keep scrap flowing continuously to reclaiming centers dealers were urged to turn over their stocks every 60 days. In past years small dealers have deemed collections of mechanicals inadvisable since amounts obtained were of mixed varieties and low quantities and therefore unprofitable to handle. To forward the realization that reclaimed rubber is just as important to the war effort as crude, it has been termed advisable to notify large dealers or local salvage committees of cases where small dealers refuse to pick up any type of scrap rubber.

Prices on solid tires, boots and shoes, hard rubber, and mechanicals are unchanged. Tubes and pneumatic tires are quoted at established ceilings.

Consumers Buying Prices

(As of March 24, 1942)

Inner Tubes *†		Prices
No. 2 passenger tubes	lb.	$0.07¾/$0.08
Red passenger tubes	lb.	.07½/ .07¾
Mixed passenger tubes	lb.	.06¾/ .07
Tires		
Pneumatic Standard*‡		
Mixed passenger tires	ton	18.00 /19.00
Beadless passenger tires	ton	24.00 /25.50
No. 2 light colored carcass	ton	50.00 /52.50
No. 1 passenger peelings	ton	47.50 /50.00
Solid Tires		
Clean mixed truck	ton	46.00 /50.00
Light gravity	ton	55.00 /60.00
Boots and Shoes		
Boots and shoes, black	lb.	.01½/ .01⅝
Colored	lb.	.01¼/ .01⅜
Untrimmed arctics	lb.	.01¼/ .01⅜
Mechanicals		
Mixed black scrap	ton	32.00 /35.00
Hose, air brake	ton	32.00 /34.00
Garden, rubber covered	ton	12.00 /14.00
Steam and water, soft	ton	12.00 /14.00
No. 1 red	lb.	.05¼/ .05¾
No. 2 red	lb.	.04½/ .05
White druggists' sundries	lb.	.04¾/ .05
Mixed mechanicals	lb.	.03 / .03½
White mechanicals	lb.	.04¾/ .05
Hard Rubber		
No. 1 hard rubber	lb.	.16 / .17

*Ceiling prices. Higher price refers to premiums. †East of Rockies. ‡Akron.

CRUDE RUBBER

Open Rubber Contracts Liquidated

ON MARCH 11 the Board of Governors of Commodity Exchange, Inc., accepted the report of the special rubber committee recommending the liquidation of the 27 open rubber contracts at 22.50¢ per pound. This was the fixed price of the Rubber Reserve Co. on February 2, the day trading was suspended in accordance with Supplementary Order M-15-b which prohibited the sale, trade, or transfer of rubber or latex. The board resolutions included liquidation of the contracts as of March 11 and charging of prescribed commissions.

Fixed Government Prices*

Plantation Grades

	Price Per Lb.
No. 1-X R.S.S. in cases†	$0.22½
No. 1 Thin Latex Crepe	.23
No. 2 Thick Latex Crepe	.23
No. 1 Brown Crepe	.21½
No. 2 Brown Crepe	.21
No. 2 Amber	.21½
No. 3 Amber	.21
Rolled Brown	.17

* For a complete list of government prices see our October 1, 1941, issue, p. 58.

New York Market Rubber Quotations

	Mar. 28, 1941	Feb. 24, 1942	Mar. 25, 1942
	(Dollars and Cents)		
Latex			
Normal and concentrated (solid content)	lb. .2722/.2753	.2825/.295	.2825/.295
Parast			
Upriver fine	lb. .22½	.38	.....
Upriver fine	lb. *.24½	*.43½	.....
Upriver coarse	lb. .14	.22	.....
Upriver coarse	lb. *.21	*.39	.....
Islands fine	lb. .22	.38	.....
Islands fine	lb. *.24	*.43	.....
Acre, Bolivian fine	lb. .22½	.38/.39	.....
Acre, Bolivian fine	lb. *.25	*.44	.....
Beni, Bolivian fine	lb. .22½	.39	.....
Madeira fine	lb. .22¼	.38	.....
Caucho†			
Upper ball	lb. .14	.22	.....
Upper ball	lb. *.21	*.39	.....
Lower ball	lb. .13½	.21	.....
Pontianak			
Pressed block	lb. .16/.24	.....	‡
Guayule			
Ampar	lb. .15½	.....	.....
Africans			
Rio Nuñez	lb. .19	.20	.20
Black Kassai	lb. .19½	.20	.20
Prime Niger flake	lb. .30	.28	.28
Gutta Percha			
Gutta Siak	lb. .16	.....	‡
Gutta Soh	lb. .24	.....	‡
Red Macassar	lb. 1.20	2.25	2.75
Balata			
Block Ciudad Bolivar	lb. .45	.60	‡
Manaos block	lb. .52	.59	‡
Surinam sheets	lb. .51	.60	‡
Amber	lb. .53	.63	‡

*Washed and dried crepe. Shipments from Brazil. †These Brazilian rubbers have been taken over by the Rubber Reserve Co., and no prices have as yet been set. ‡None available at present.

Hecht, Levis & Kahn, Inc., crude rubber brokerage, has leased the fifteenth floor at 76 Beaver St., New York, N. Y.

RECLAIMED RUBBER

RECLAIMED rubber demands in March were reportedly greater than the available supply. As a result of the serious shortage of scrap rubber, Amendment No. 6 to Supplementary Order No. M-15-b, issued and effective March 20, places strict controls on the sale and use of scrap and reclaimed rubber. At the time the order was released the Rubber Branch of the WPB emphasized that if adequate quantities of scrap rubber are not made available, the capacity of the reclaiming industry cannot be operated at peak level. The full capacity of the industry is necessary for war and essential civilian production.

Prices quoted below are at established ceilings.

New York Quotations

	Sp. Grav.	¢ per lb.
Auto Tire		
Black Select	1.16-1.18	6½/ 6¾
Acid	1.18-1.22	7½/ 7¾
Shoe		
Standard	1.56-1.60	7 / 7¼
Tubes		
Black	1.14-1.26	11¼/11½
Gray	1.15-1.26	12½/13¼
Red	1.15-1.32	12 /12¼
Miscellaneous		
Mechanical blends	1.25-1.50	4½/ 5½
White	1.35-1.50	13½/14½

The above list includes those items or classes only that determine the price bases of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

Tire Production Statistics

	Pneumatic Casings		
	Inventory	Production	Shipments
1939	8,664,505	57,612,731	57,508,775
1940	9,126,528	59,186,423	58,774,437
1941	4,416,640	61,532,656	66,162,707
1942			
Jan.	4,550,068	1,368,787	1,231,422
Feb.	4,552,702	1,112,907	1,115,950

	Pneumatic Casings		
	Original Equipment	Replacement Sales	Export Sales
1939	18,207,556	38,022,034	1,279,185
1940	22,252,869	35,345,656	1,175,912
1941	24,778,505	39,900,058	1,484,144
1942			
Jan.	985,010	227,347	19,065
Feb.	.....	.....	.....

	Inner Tubes		
	Inventory	Production	Shipments
1939	7,035,671	50,648,556	51,190,314
1940	7,016,948	52,237,003	52,214,070
1941	4,678,407	57,382,118	59,689,072
1942			
Jan.	4,712,113	1,327,656	1,256,609
Feb.	4,677,671	1,050,790	1,090,468

	Inner Tubes		
	Original Equipment	Replacement Sales	Export Sales
1939	18,190,630	31,997,906	1,001,778
1940	22,172,452	29,069,547	972,080
1941	24,722,006	33,737,494	1,229,572
1942			
Jan.	1,030,890	212,152	18,351
Feb.	.....	.....	.....

Source: The Rubber Manufacturers Association, Inc.

COMPOUNDING INGREDIENTS

THE decreased demand in March for some compounding ingredients by the rubber industry reflects the curtailed manufacturing of tires and other rubber products. Prices are generally steady for those materials for which maximum ceilings have not been set by the OPA.

CARBON BLACK. Movement into consuming channels continued light. It is expected that rubber restrictions will keep consumption to a sub-normal level and that production will be sufficient to meet domestic, export, and lend-lease requirements. Prices are unchanged.

FACTICE OR RUBBER SUBSTITUTE. WPB General Preference Order No. M-77, issued March 25 and effective April 1, limits the use of rapeseed oil to the manufacture of factice for rubber compounding and two other essential war needs. For development of a stockpile, 30% of all inventories in excess of 50,000 pounds are to be set aside. Prices have increased.

LITHARGE. The demand continued greater than offerings, which were at normal levels. Prices are firm.

LITHOPONE. Sales of the available supply were largely on an allocated basis. Amendment No. 1 to OPA Price Schedule No. 80, effective February 27, granted permission to lithopone dealers and exporters other than manufacturers to fulfill contracts made prior to February 2 (the effective date of lithopone price ceilings) at prices in accordance with the contract terms.

RUBBER CHEMICALS. A decreased call is believed to be the result of restrictions on the manufacture of rubber products. Prices held steady.

RUBBER SOLVENTS. Losses in volume of movements because of decreased tire production are largely offset by demand from sources in which rubber is used for products more directly relating to defense. Prices are firm.

SULPHUR. Production of crude sulphur in the United States in 1941 reached a new record of 3,139,253 long tons, according to the Bureau of Mines, and was 15% over the 1940 output of 2,732,088 long tons. Stocks of sulphur at mines decreased from 4,200,000 long tons on January 1, 1941, to 3,900,000 long tons at the end of the year. The latter figure is more than a year's supply at the current rate of consumption. The price held to the level of recent years and was quoted throughout 1941 at $16 a long ton, f.o.b. mines.

Movements to the rubber industry have decreased. An increase of 25¢ per cwt. for refined sulphur is effective April 1.

TITANIUM PIGMENTS. The demand by the rubber industry was less than normal. Amendment No. 1 to OPA Revised Price Schedule No. 98, effective March 1, permitted one producer of titanium pigments to charge 1½¢ a pound above the established ceiling price until May 2. The amendment corrects a temporary hardship on the producer who is developing a domestic source of supply, but who at the present obtains ilmenite from India at $31.50 per ton.

ZINC OXIDE. With some rubber factories continuing at a high rate of production and others operating at below capacity levels, orders from the rubber industry were markedly spotty. The market is reported in an easier condition than for the past several months. Supplementary Order M-11-I (WPB), March 3, set March lead-free zinc-oxide pool requirements at 20% of December, 1941, production and leaded zinc oxide at 10%. Prices are firm.

Current Quotations*

Abrasives

Pumicestone, powdered	lb.	$0.035	$0.04
Rottenstone, domestic	lb.	.025	

Accelerators, Inorganic

Lime, hydrated, *l.c.l.*, New York	ton	25.00	
Litharge (commercial)	lb.	.09	
Magnesia, calcined, heavy	lb.		
technical, light	lb.	.0625/	.07

Accelerators, Organic

A-1	lb.	.26 /	.35
A-10	lb.	.36 /	.42
A-19	lb.	.52 /	.65
A-32	lb.	.60 /	.70
A-46	lb.	.50 /	.57
A-77	lb.	.42 /	.55
A-100	lb.	.42 /	.55
Accelerator 49	lb.		
808	lb.	.60 /	.62
833	lb.	1.15	
Acrin	lb.	.65	
Aldehyde ammonia	lb.	.65 /	.70
Altax	lb.	.45	
B-J-F	lb.	.40 /	.45
Beutene	lb.	.60 /	.65
Butasan	lb.	1.15	
Butyl Eight	lb.	.98 /	1.00
C-P-B	lb.	2.00	
Captax	lb.	.40	
D-B-A	lb.	2.00	
Delac A	lb.	.40 /	.50
O	lb.	.40 /	.50
P	lb.	.40 /	.50
Di-Esterex-N	lb.	.50 /	.60
DOTG (Di-ortho-tolyguanidine)	lb.	.44 /	.46
DPG (Diphenylguanidine)	lb.	.36 /	.36
El-Sixty	lb.	.40 /	.47
Ethasan	lb.	1.15	
Ethylideneaniline	lb.	.42 /	.43
Formaldehyde P.A.C	lb.	.06 /	.0625
Formaldehyde-para-toluidine	lb.	.65	
Formaniline	lb.	.36 /	.37
Guantal	lb.	.40 /	.50
Hepteen	lb.	.35 /	.40
Base	lb.	1.35 /	1.50
Hexamethylenetetramine U.S.P.	lb.	.39	
Technical	lb.	.33	
Lead oleate, No. 999	lb.	.1475	
Witco	lb.	.15	
Ledate	lb.	1.5¢	
Methasan	lb.	1.25	
Methazate	lb.	1.25	
Monex	lb.	1.55	
Morfex "33"	lb.	.68 /	.73
"55"	lb.	.97 /	1.02
O-X-A-F	lb.	.40 /	.45
Oxynone	lb.	.77 /	.90
Para-nitroso-dimethylaniline	lb.	.85	
Pentex	lb.	.75 /	.85
Flour	lb.	.125 /	.135
O	lb.		
Flour	lb.		
Phenex	lb.	.50 /	.55
Pip-Pip	lb.	1.65	
R & H 50-D	lb.	.42 /	.43
Rotax	lb.	.50	
Safex	lb.	1.20 /	1.30
Santocure	lb.	.60 /	.67
Selenac	lb.	2.00	
SPDX	lb.	.70 /	.75
A	lb.	.70 /	.75
Super sulphur No. 2	lb.	.14 /	.16
Tetrone A	lb.	2.20	
Thiocarbanilide	lb.	.28 /	.33
Thionex	lb.	1.55	
Thiurad	lb.	1.55	
Trimene	lb.	$0.55	/$0.65
Base	lb.	1.05 /	1.20
Triphenylguanidine (TPG)	lb.	.45	
Tuads, Methyl	lb.	1.55	
2-MT	lb.	.75	
Ulto	lb.	1.00 /	1.05
Ureka	lb.	.50 /	.57
Blend B	lb.	.50 /	.57
C	lb.	.48 /	.55
Vulcanex	lb.	.42 /	.43
Z-B-X	lb.	2.50	
Zenite	lb.	.40 /	.42
A	lb.	.45 /	.47
B	lb.	.42 /	.44
Zimate, Butyl	lb.	1.15	
Ethyl	lb.	1.15	
Methyl	lb.	1.25	
Zipacel	lb.	1.65	

Activators

Aero Ac 50	lb.		
Barak	lb.	.50	
MODX	lb.	.30 /	.35
SL No. 20	lb.	.11 /	.115

Age Resisters

AgeRite Alba	lb.	2.00	
Gel	lb.	.57 /	.59
Hipar	lb.	.65 /	.67
Powder	lb.	.52 /	.54
Resin	lb.	.52 /	.54
D	lb.	.52 /	.54
White	lb.	1.25 /	1.40
Albasan	lb.	.70 /	.75
Aminox	lb.	.52 /	.61
Antox	lb.	.56	
Betanox	lb.	.52 /	.61
B-L-E	lb.	.52 /	.61
Powder	lb.	.65 /	.74
B-X-A	lb.	.52 /	.61
Copper Inhibitor X-872-A	lb.	1.15	
Flectol H	lb.	.52 /	.65
White	lb.	.90 /	1.15
M-U-F	lb.	1.50	
Neozone (standard)	lb.	.63	
A	lb.	.52 /	.54
C	lb.	.52 /	.54
D	lb.	.52 /	.54
E	lb.	.63	
Oxynone	lb.	.77 /	.90
Permalux	lb.	1.20	
Santoflex B	lb.	.52 /	65
BX	lb.	.58 /	.71
Santovar A	lb.	1.15 /	1.40
Stabilite	lb.	.52 /	.54
Alba	lb.	.70 /	.75
Thermoflex A.	lb.	.65 /	.67
C	lb.	.58 /	.60
Tysonite	lb.	.16 /	.165
V-G-B	lb.	.52 /	.61

Alkalies

Caustic soda, flake, Columbia (400-*lb. drums*)	100 lbs.	2.70 /	3.55
liquid, 50%	100 lbs.	1.95	
solid (700-*lb. drums*)	100 lbs.	2.30 /	3.15

Antiscorch Materials

Antiscorch T	lb.	.90	
Cumar RH	lb.	.105	
E-S-E-N	lb.	.35 /	.40
R-17 Resin (*drums*)	lb.	.1075	
RM	lb.	1.25	
Retarder W	lb.	.36	
Retardex	lb.	.45 /	.48
U-T-B	lb.	.35 /	.40

Antisun Materials

Heliozone	lb.	.23 /	.24
S.C.R.	lb.	.33 /	.35
Sunproof	lb.	.23 /	.28
Jr.	lb.	.165 /	.215

Blowing Agents

Ammonium Carbonate, lumps (500-*lb. drums*)	lb.		
Unicel	lb.	.50	

Brake Lining Saturant

B.R.T. No. 3	lb.	.0175/	.0185

Colors

Black

Du Pont powder	lb.	.42	
Lampblack (commercial), *l.c.l.*	lb.	.15	

Blue

Du Pont Dispersed	lb.	.35 /	3.95
Powders	lb.	2.25 /	3.75
Heliogen BKA	lb.		
Toners	lb.		

Brown

Mapico	lb.	.11	

Green

Chrome	lb.	.25	
oxide (*freight allowed*)	lb.	.24	
Du Pont Dispersed	lb.	.08 /	2.85
Powders	lb.	1.00	
Guignet's (*bbls.*)	lb.	.70	
Toners	lb.		

Orange

Du Pont Dispersed	lb.	.88 /	2.35
Powders	lb.	2.75 /	3.05
Toners	lb.		

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing of known ingredients. Requests for information not recorded will receive prompt attention.

Orchid
- Toners ..... lb.

Pink
- Toners ..... lb.

Purple
- Toners ..... lb.

Red
- Antimony
  - Crimson, 15/17% ..... lb.
  - R. M. P. No. 3 ..... lb. $0.48
  - Sulphur free ..... lb.
  - R.M.P. ..... lb. .52
  - Golden 15/17% ..... lb.
  - 7-A ..... lb. .37
  - Z-2 ..... lb. .25
- Cadmium, light (400-lb. bbls.) ..... lb. .80 /$0.85
- Du Pont Dispersed ..... lb. .93 / 2.05
- Powders ..... lb. .60 / 1.65
- Iron Oxide, *l.c.l.* ..... lb.
- Mapico ..... lb. .0975
- Rub-Er-Red (*bbls.*) ..... lb. .0975
- Toners ..... lb.

White
- Lithopone (*bags*) ..... lb. .0425 /.045
- Albalith ..... lb. .0425/ .045
- Astrolith (50-*lb. bags*) ..... lb. .0425/ .045
- Azolith ..... lb. .0425/ .045
- Titanium Pigments
  - Ray-bar ..... lb. .055 / .065
  - Ray-cal ..... lb. .0525/ .0625
  - Rayox ..... lb. .135 / .165
  - Titanolith (50-*lb. bags*) ..... lb. .056 / .0585
  - Titanox-A ..... lb. .145 / .175
  - B ..... lb. .0575/ .0625
  - 30 ..... lb. .0575/ .0625
  - C ..... lb. .055 / .06
  - M ..... lb. .0575/ .0625
  - RC ..... lb. .055 / .06
  - RC-HT ..... lb. .055 / .06
  - Ti-Tone ..... lb.
  - Zopaque (50-*lb. bags*) ..... lb. .16 / .165
- Zinc Oxide
  - Azo ZZZ-11 ..... lb. .0725/ .075
  - 44 ..... lb. .0725/ .075
  - 55 ..... lb. .0725/ .075
  - 66 ..... lb. .095 / .0975
  - French Process, Florence
    - Green Seal-8 ..... lb. .09 / .0925
    - Red Seal-9 ..... lb. .085 / .0875
    - White Seal-7 ..... lb. .095 / .0975
  - Kadox, Black Label-15 ..... lb. .0725/ .075
  - No. 25 ..... lb. .085 / .0875
  - 72 ..... lb. .0725/ .075
  - Red Label-17 ..... lb. .0725/ .075
  - Horse Head Special 3 ..... lb. .0725/ .075
  - XX Red-4 ..... lb. .0725/ .075
  - 23 ..... lb. .0725/ .075
  - 72 ..... lb. .0725/ .075
  - 78 ..... lb. .0725/ .075
  - 80 ..... lb. .0725/ .075
  - 103 ..... lb. .0725/ .075
  - 110 ..... lb .0725/ .075
  - St. Joe (lead free)
    - Black Label ..... lb. .0725/ .075
    - Green Label ..... lb. .0725/ .075
    - Red Label ..... lb. .0725/ .075
  - U.S.P. ..... lb. .105 / .1075
- Zinc Sulphide Pigments
  - Cryptone-BA-19 ..... lb. .056 / .0585
  - BT ..... lb. .056 / .0585
  - CB ..... lb. .056 / .0585
  - MS ..... lb. .0575/ .06
  - ZS No. 20 ..... lb. .0825/ .085
  - 86 ..... lb. .0825/ .085
  - 230 ..... lb. .0825/ .085
  - 800 ..... lb. .0825/ .085
- Sunolith ..... lb. .0425/ .045

Yellow
- Cadmolith (cadmium yellow), (400-*lb. bbls.*) ..... lb. .55 / .60
- Du Pont Dispersed ..... lb. 1.25 / 1.85
- Powders ..... lb. .70 / 1.75
- Mapico ..... lb. .0725
- Toners ..... lb.

Dispersing Agents

- Bardex ..... lb. .0425/ .045
- Bardol ..... lb. .025 / .0275
- B ..... lb. .05 / .0525
- Darvan No. 1 ..... lb. .30 / .34
- No. 2 ..... lb. .30 / .34
- No. 3 ..... lb. .30 / .34
- Nevoll (*drums, c.l.*) ..... lb. .0225
- Santomerse S ..... lb. .11 / .25

Extenders

- Naftolen ..... lb. .15 / .25
- Vanzak ..... gal. .05 / .06

Fillers, Inert

- Asbestine, *c.l.* ..... ton 20.00
- Asbestos Fiber ..... ton 15.50 /48.00
- Barytes ..... ton 40.00
- f.o.b., St. Louis (50-*lb. paper bags*) ..... ton 25.55
- off color, domestic ..... ton 29.00
- white, domestic ..... ton 38.50
- Blanc fixe, dry, precip. ..... lb. .065
- Calcene ..... ton 37.50 /43.00
- Infusorial earth ..... lb. .0225
- Kalite No. 1 ..... ton $26.00
- 3 ..... ton 36.00
- Kalvan ..... ton 100.00
- Magnesium Carbonate, *l.c.l.* .. lb. .0725/$0.1075
- Paradene No. 2 (*drums*) .... lb. .0525
- Pyrax A ..... ton 7.50
- Whiting
  - Columbia Filler ..... ton 9.00 /14.00
  - Suprex White ..... ton 32.50
  - Witco, *c.l.* ..... ton 8.00

Finishes

- Black-Out (surface protective) ..... gal. 4.50 / 5.00
- Mica, *l.c.l.* ..... ton
- Rubber lacquer, clear ..... gal. 1.00 / 2.00
- colored ..... gal. 2.00 / 3.50
- Shoe varnish ..... gal. 1.45
- Talc ..... ton 25.00

Flock

- Cotton flock, dark ..... lb. .09 / .11
- dyed ..... lb. .40 / .80
- white ..... lb. .12 / .20
- Rayon flock, colored ..... lb. 1.00 / 1.50
- white ..... lb. .75 / 1.00

Latex Compounding Ingredients

- Accelerator 552 ..... lb. 1.65
- Aerosol OT Aqueous 10% .. lb.
- Antox, dispersed ..... lb. .54
- Aquarex D ..... lb. .75
- F ..... lb. .85
- MDL Paste ..... lb. .25
- Areskap No. 50 ..... lb. .18 / .24
- 100, dry ..... lb. .39 / .51
- Aresket No. 240 ..... lb. .16 / .22
- 300, dry ..... lb. .42 / .50
- Aresklene No. 375 ..... lb. .35 / .50
- 400, dry ..... lb. .51 / .65
- Black No. 25, dispersed ..... lb. .22 / .40
- Casein ..... lb.
- Collocarb ..... lb. .07
- Color Pastes, dispersed ..... lb. .75 / 1.10
- Copper Inhibitor X-872 ..... lb. 2.25
- Dispersex No. 15 ..... lb. .11 / .12
- No. 20 ..... lb. .08 / .10
- Factex Dispersion A ..... lb. .17
- Heliozone, dispersed ..... lb. .25
- MICRONEX, Colloidal ..... lb. .06 / 07
- R-2 Crystals ..... lb. 1.55 / 1.70
- S-1 (400-*lb. drums*) ..... lb. .65
- Santobrite Briquettes ..... lb.
- Powder ..... lb.
- Santomerse D ..... lb. .41 / .65
- S ..... lb. .11 / .25
- Sodium Stearate ..... lb. .40
- Stablex A ..... lb. .90 / 1.10
- B ..... lb. .65 / .90
- C ..... lb. .40 / .50
- Sulphur, dispersed ..... lb. .10 / .15
- No. 2 ..... lb. .08 / .12
- T-1 (440-*lb. drums*) ..... lb. .40
- Tepidone ..... lb. .63
- Tetrone A ..... lb. 2.20
- Zenite Special ..... lb. .55
- Zinc oxide, dispersed ..... lb. .12 / .15

Mineral Rubber

- Black Diamond, *l.c.* ..... ton 25.00 /27.00
- B.R.C. No. 20 ..... lb. .0105/ .0115
- Hydrocarbon, Hard ..... lb. 25.00 /27.00
- Parmr ..... ton 25.00 /29.00
- Pioneer, *c.l.* ..... lb. 25.00 /27.00
- 285°-300° ..... ton 25.00 /27.00

Mold Lubricants

- Aluminum Stearate ..... lb. .21 / .24
- Aquarex D ..... lb. .75
- MDL Paste ..... lb. .25
- Colite ..... gal. .90 / 1.15
- Lubrex ..... lb. .25 / .30
- Mold Paste ..... lb. .12 / .30
- Rubber-Glo, conc. regular .. gal. .94 / 1.15
- Type W ..... gal. .99 / 1.20
- Sericite ..... ton 65.00
- Soapstone, *l.c.l.* ..... ton 22.50
- Zinc Stearate ..... lb. .28 / .31

Oil Resistant

- A-X-F ..... lb. .82 / .85

Reclaiming Oils

- B.R.V ..... lb. .035 / .0375
- C-10 ..... gal. .19 / .24
- D-4 ..... gal. .17 / .22
- E-5 ..... gal. .15 / .20
- No. 1621 ..... lb. .021 / .0235
- S.R.O. ..... lb. .02 / .0225
- Type C (for synthetic rubber) ..... gal. .33 / .38
- X-159 ..... gal. .20 / .32

Reenforcers

- Carbon Black
  - Aerflotex Arrow Specification (*bags only*) ..... lb. .0355†
  - Arrow Compact Granulized ..... lb. .0355†
- Certified Heavy Compressed (*bags only*) .. lb. $0.355†
- Spheron ..... lb. .0355†
- Continental, dustless ..... lb. .0355†
- Compressed (*bags only*) . lb. .0355†
- Disperso ..... lb. .0355†
- Dixie ..... lb. .0355†
- Dixiedensed ..... lb. .0355†
- 66 ..... lb. .0355†
- Furnex ..... lb. .035
- Beads ..... lb. .035
- Gastex ..... lb. .035 /$0.06
- HX ..... lb. .0355†
- Kosmobile ..... lb. .0355†
- 66 ..... lb. .0355†
- Kosmos ..... lb. .0355†
- Dixie 20 ..... lb. .035†
- MICRONEX Beads ..... lb. .0355†
- Mark II ..... lb. .0355
- Standard ..... lb. .0355
- W-5 ..... lb. .0355
- W-6 ..... lb. .0355
- P-33 ..... lb. .0475
- Pelletex ..... lb. .035 / .06
- Thermax ..... lb. .0225
- "S" ..... lb. .075 / .10
- TX ..... lb. .0355†
- Velvetex ..... lb. .04 / .06
- "WYEX BLACK" ..... lb. .0355†
- Carbonex Flakes ..... lb. .03 / .035
- S ..... lb. .031 / .036
- Plastic ..... lb. .031 / .0335
- Clays
  - Aerfloted Hi-White ..... ton 11.00
  - LGB ..... ton 15.00
  - Paragon (50-*lb. bags*) .. ton 10.00
  - Suprex (50-*lb. bags*) .. ton 11.00 /23.50
  - Catalpo, *c.l.* ..... ton 30.00
  - China ..... ton 25.00
  - Crown ..... ton 11.00
  - Dixie ..... ton 11.00
  - "L" ..... ton
  - Langford ..... ton 8.50
  - McNamee ..... ton 10.00
  - Par ..... ton 11.00
  - Paraforce, *c.l.* ..... ton 50.00
  - Witco, *c.l.* ..... ton 10.00
- Cumar EX ..... lb. .05
- MH ..... lb. .065 / .115
- V ..... lb. .095 / .125
- Silene ..... lb. .04 / .045

Reodorants

- Amora A ..... lb.
- B ..... lb.
- C ..... lb.
- D ..... lb.
- Curodex 19 ..... lb.
- 188 ..... lb.
- 198 ..... lb.
- Rodo No. 0 ..... lb. 4.00 / 4.50
- 10 ..... lb. 5.00 / 5.50

Rubber Substitutes

- Black ..... lb. .085 / .13
- Brown ..... lb. .085 / .1375
- White ..... lb. .09 / .15
- Factice
  - Amberex Type B ..... lb. .1875
  - Brown ..... lb. .10 / .155
  - Fac-Cel B ..... lb. .150
  - C ..... lb. .150
  - Neophax A ..... lb. .165
  - B ..... lb. .165
  - White ..... lb. .11 / .155

Softeners and Plasticizers

- B.R.T. No. 7 ..... lb. .02 / .021
- Bondogen ..... lb. .98 / 1.05
- Bunnatol (for synthetic rubber) ..... lb. .39 / .40
- Burgundy pitch ..... lb.
- Copene Resin ..... lb. .32
- Cycline oil ..... gal. .14 / .20
- Dipolymer Oil ..... gal. .33 / .38
- Dispersing Oil No. 10 ..... lb. .0375/ .04
- Nevinol ..... lb. .13 / .14
- Nuba resinous pitch (*drums*)
  - Grades No. 1 and No. 2 .. lb. .029
  - 3-X ..... lb. .0425
- Nypene Resin ..... lb. .32
- Palm oil (Witco), *c.l.* ..... lb.
- Palmalene ..... lb. .15 / .40
- Palmol ..... lb. .16
- Para Flux (reg.) ..... gal. .17 / .18
- No. 2016 ..... gal. .135 / .19
- Para Lube ..... lb. .046 / .048
- Piccolyte Resins ..... lb. .15 / .185
- Piccoumaron Resins ..... lb. .045 / .15
- Pine tar ..... gal.
- Oil ..... gal.
- Plastogen ..... lb. .0775/ .08
- Plastone ..... lb. .27 / .30
- R-19 Resin (*drums*) ..... lb. .1075
- 21 Resin (*drums*) ..... lb. .1075
- Reogen ..... lb. .115 / .12
- RPA No. 2 ..... lb. .65
- 3 ..... lb. .46
- 4 ..... lb. .80
- Tackol ..... lb. .085 / .18
- Tonox ..... lb. .52 / .61
- Witco No. 20, *l.c.l.* ..... gal. .20
- X-1 resinous oil (*tank car*) .. lb. .011

Softeners for Hard Rubber Compounding

- Resin C Pitch 45°C. M.P. .. lb. .015 / .016
- 60°C. M.P. ..... lb. .015 / .016
- 75°C. M.P. ..... lb. .015 / .016

†Price quoted is f.o.b. works (bags). The price f.o.b. works (bulk) is $0.033 per pound. All prices are carlot.

Solvents

Beta-Trichlorethane	lb.	$0.20
Carbon Bisulphide	lb.	
Tetrachloride	gal.	
Cosol No. 1	gal.	.26
No. 2	gal.	.25
No. 3	gal.	.22
Industrial 90% benzol (*tank car*)	gal.	.15
Picco	gal.	.22 /$0.32
Skellysolve	gal.	

Stabilizers for Cure

Barium Stearate	lb.	.27 / .30
Calcium Stearate	lb.	.23 / .27
Laurex (*bags*)	lb.	.15 / .175
Lead Stearate	lb.	
Magnesium Stearate	lb.	.29 / .32
Stearex B	lb.	.1525/ .1625
Beads	lb.	.147 / .157
Stearic acid, single pressed.	lb.	.1525/ .1625
Stearite, *c.l.*	lb.	.1470
Zinc Laurate	lb.	.29 / .32
Stearate	lb.	.28 / .31

Synthetic Rubber

Neoprene Latex Type 56	lb.	.30
57	lb.	.30
60	lb.	.36
Neoprene Type CG	lb.	.70
E	lb.	.65
FR	lb.	.75
G	lb.	.70
GN	lb.	.65
I	lb.	.70
KN	lb.	.75
M	lb.	.65
Synthetic 100	lb.	.41
"Thiokol" Type "A"	lb.	.35 / .45
"PA"	lb.	.50 / .60
"RD"	lb.	.70

Tackifier

B.R.H. No. 2	lb.	.02 / .021

Vulcanizing Ingredients

Magnesia, light		
(for neoprene)	lb.	.26
Sulphur	100 lbs.	
Chloride (*drums*)	lb.	.04
Telloy	lb.	1.75
Vandex	lb.	1.75
(See also Colors—Antimony)		

Waxes

736 (clear)	gal.	1.25
737 (black)	gal.	1.35
1515-A (black)	gal.	1.35
Carnauba, No. 3 chalky	lb.	
2 N.C.	lb.	
3 N.C.	lb.	
1 Yellow	lb.	
2	lb.	
Carnube	lb.	.46 / .56
Monten	lb.	.12 / .17
Rubber Wax No. 118,		
Neutral	gal.	.76 / 1.31
Colors	gal.	.86 / 1.41

OHIO

(*Continued from page 70*)

The Bridgwater Machine Co., Akron, has formed a new wholly owned subsidiary, The Bridgwater Mfg. Co., to take care of the assembly of certain armaments to be made under ordnance contracts.

E. L. Antonen, executive of the Denman Tire & Rubber Co., Warren, recently addressed the Cincinnati Chapter of the National Association of Cost Accountants.

The Glidden Co., Cleveland, recently honored 24 employes with more than a quarter-century of service at a dinner at the Hotel Cleveland. President Adrian D. Joyce presented each veteran with an engraved gold watch.

Rubber and Canvas Footwear Statistics

	Thousands of Pairs		
	Inventory	Production	Shipments
1938	16,183	50,812	54,942
1939	**16,388**	**60,612**	**60,377**
1940	**11,129**	**57,278**	**62,480**
1941	9,170	72,217	74,080
1941			
Jan.	**10,377**	**5,939**	**6,614**
Feb.	**10,754**	**5,543**	**5,166**
Mar.	11,223	5,827	5,359
Apr.	**12,272**	**6,628**	**5,555**
May	**13,223**	**6,084**	**5,134**
June	13,834	6,278	5,668
July	**12,256**	**4,789**	**6,366**
Aug.	10,809	5,543	6,990
Sept.	9,228	5,844	7,422
Oct.	8,650	6,848	7,433
Nov.	8,725	6,362	6,287
Dec.	9,170	6,532	6,086

Source: *Survey of Current Business*, Bureau of Foreign & Domestic Commerce, Washington, D. C.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Hard Rubber Co.	Non-Vt.	$0.25	Mar. 31	Mar. 21
American Hard Rubber Co.	Pfd.	$1.75	Mar. 31	Mar. 21
Anaconda Wire & Cable Co.	Com.	$0.50	Apr. 20	Apr. 10
Asbestos Mfg. Co.	Cum. Cv. Pfd.	$0.35	Mar. 10	Feb. 28
Collyer Insulated Wire & Cable Co.	Com.	$0.50	Apr. 1	Mar. 24
Baldwin Rubber Co.	Com.	$0.125	Apr. 21	Apr. 9
Dayton Rubber Mfg. Co.	Com.	$0.25	Mar. 21	Mar. 7
Detroit Gasket & Mfg. Co.	Com.	$0.25 q.	Apr. 20	Apr. 4
Dewey & Almy Chemical Co.	Com.	$0.25	Mar. 15	Feb. 28
Dewey & Almy Chemical Co.	"B"	$0.25	Mar. 15	Feb. 28
Dominion Textile Co., Ltd.	Com.	$1.25 q.	Apr. 1	Mar. 5
Dominion Textile Co., Ltd.	7% Pfd.	$1.75 q.	Apr. 15	Feb. 26
E. I. du Pont de Nemours & Co., Inc.	Com.	$1.25 int.	Mar. 14	Feb. 24
E. I. du Pont de Nemours & Co., Inc.	Pfd.	$1.125	Apr. 25	Apr. 10
Electric Storage Battery Co.	Com.	$0.50 accum. surplus	Mar. 31	Mar. 10
Endicott Johnson Corp.	Com.	$0.75	Mar. 26	Apr. 15
Faultless Rubber Co.	Com.	$0.25	Apr. 1	Mar. 16
Firestone Tire & Rubber Co.	Com.	$0.25	Apr. 20	Apr. 4
Garlock Packing Co.	Com.	$0.75	Mar. 31	Mar. 21
B. F. Goodrich Co.	$5 Cum. Pfd.	$1.25 q.	Mar. 31	Mar. 20
Goodyear Tire & Rubber Co. of Canada, Ltd.	Com.	$0.62 q.	Apr. 1	Mar. 14
Goodyear Tire & Rubber Co. of Canada, Ltd.	5% Pfd.	$0.625 q.	Apr. 1	Mar. 14
Hercules Powder Co.	Com.	$0.60	Mar. 25	Mar. 13
Hercules Powder Co.	Pfd.	$1.50 q.	May 15	May 4
Jenkins Bros.	Non-Vt.	$0.25	Mar. 25	Mar. 13
Jenkins Bros.	Fdrs. Sh.	$1.00	Mar. 25	Mar. 13
Jenkins Bros.	7% Pfd.	$1.75 q.	Mar. 25	Mar. 13
I. B. Kleinert Rubber Co.	Com.	$0.20	Mar. 14	Mar. 2
Mansfield Tire & Rubber Co.	Com.	$0.25 q.	Mar. 20	Mar. 10
Mansfield Tire & Rubber Co.	Cv. Pfd.	$1.75 q.	Apr. 1	Mar. 14
Russell Mfg. Co.	Com.	$0.375	Mar. 16	Feb. 28
Seiberling Rubber Co.	$2.50 Pr. Pfd.	$0.63 q.	Apr. 1	Mar. 20
Seiberling Rubber Co.	"A" Pfd.	$1.25 q.	Apr. 1	Mar. 20
A. G. Spalding & Bros.	1st Pfd.	$1.50 initial	Mar. 16	Mar. 7

NEW ENGLAND

Dewey & Almy Chemical Co., Cambridge B, Mass., has developed a new synthetic bonding agent for use in its insole material as a substitute for the rubber formerly used. The firm has also announced that a plant for the manufacture of synthetic rubber is scheduled for completion late this spring, the output of which will be suitable for replacing much of the natural rubber necessary for compounds for sealing containers for foods and other essential industrial products.

General Insulated Wire Co., 69 Gordon Ave., Providence, R. I., will build an addition to its plant to cost about $5,000.

The Sponge Rubber Products Co., Derby, Conn., according to President F. M. Daley, is manufacturing sponge rubber using nothing but reclaimed rubber.

Firestone Rubber & Latex Products Co., Fall River, Mass., has announced that the plant that was destroyed in the fire of October 11 will be rebuilt in the near future. At present the company has about 3,000 workers, and after the rebuilding at least 2,000 more will be hired.

Stephen C. Garrity, State Fire Marshal of The Commonwealth of Massachusetts, reports that this fire was due to spontaneous ignition. Approximately 25 buildings and contents were totally destroyed, and 18,500 tons of rubber, less about 5,000 tons salvaged, were lost. The total fire loss is estimated at $11,000,000, exclusive of indirect losses due to interruption of production and employment.

C. Lawrence Munch, president, Hood Rubber Co., Watertown, Mass., on March 2 declared that careful distribution or even outright rationing of rubber footwear is a real possibility for next fall and winter. Stocks of rubber footwear in manufacturers' hands are practically cleaned out, and use of rubber for footwear is restricted.

Rhode Island rubber manufacturers during January had payrolls totaling $348,704, compared with $497,000 in December, 1941, and also 2.3% under figures for January, 1941. These declines are due to the restricted rubber consumption decreed by government order. To date about 1,400 rubber workers have been let go because of this curtailment of non-essential civilian goods.

Collyer Insulated Wire Co., Pawtucket, R. I., has embarked upon an extensive expansion program. A large tract of land adjoining the plant on Roosevelt St. has been purchased from the city. Besides the recently announced two-story factory addition, the company will also erect a one-story brick building to cover 10,000 square feet of land.

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

Futures	Jan. 31	Feb. 28	Mar. 7	Mar. 14	Mar. 21
Mar.	18.55	18.49	18.40	18.51	....
Apr.	....	18.59	18.47	18.54	18.60
July	18.76	18.79	18.65	18.67	18.70
Sept.	18.72	18.84	18.71	18.71	18.76
Dec.	18.71	18.91	18.75	18.75	18.84
Jan.	18.75	18.94	18.76	18.77	18.84
Mar.	....	....	....	....	18.91

New York Quotations

March 24, 1942

Drills

38-inch 2.00-yard	yd.	....
40-inch 3.47-yard		....
50-inch 1.52-yard		$0.31
52-inch 1.85-yard		.25⅝
52-inch 1.90-yard		.24⅜/.25
52-inch 2.20-yard		.22¼
52-inch 2.50-yard		.19⅝
59-inch 1.85-yard		.25

Ducks

38-inch 2.00-yard D. F.	yd.	.22½/.23
40-inch 1.45-yard S. F.		.30⅝
51½-inch 1.35-yard D. F.		.33⅜
72-inch 1.05-yard D. F.		.45¾/.50
72-inch 17-21 ounce		.57

Mechanicals

Hose and belting	lb.	.48½

Tennis

51½-inch 1.35-yard	yd.	.33¼
51½-inch 1.60-yard	yd.	.28¾
51½-inch 1.90-yard	yd.	.24½

Hollands—White

Blue Seal

20-inch	yd.	....
30-inch		....
40-inch		....

Gold Seal

20-inch No. 72	yd.	....
30-inch No. 72		....
40-inch No. 72		....

Red Seal

20-inch	yd.	....
30-inch		....
40-inch		....

Osnaburgs

40-inch 2.34-yard	yd.	.15⅝
40-inch 2.48-yard		.14⅝
40-inch 2.56-yard		.13992
40-inch 3.00-yard		.12⅛
40-inch 7-ounce part waste		.15
40-inch 10-ounce part waste		.21⅛
37-inch 2.42-yard clean		.15

Raincoat Fabrics

Cotton

Bombazine 64 x 60	yd.	....
Plaids 60 x 48		....
Surface prints 64 x 60		....
Print cloth, 38½-inch, 64 x 60		.08691

Sheetings, 40-Inch

48 x 48, 2.50-yard	yd.	.15600
64 x 68, 3.15-yard		.13492
56 x 60, 3.60-yard		.11527
44 x 40, 4.25-yard		.09411

Sheetings, 36-Inch

48 x 48, 5.00-yard	yd.	.08300
44 x 40, 6.15-yard		.06747

Tire Fabrics

Builder

17¼ ounce 60" 23/11 ply Karded peeler	lb.	.47

Chafer

14 ounce 60" 20/8 ply Karded peeler	lb.	.46
9¾ ounce 60" 10/2 ply Karded peeler	lb.	.46

Cord Fabrics

23/5/3 Karded peeler, 1 1/16" cotton	lb.	.47
15/3/3 Karded peeler, 1 1/16" cotton	lb.	.45
12/4/2 Karded peeler, 1 1/16" cotton	lb.	.46
23/5/3 Karded peeler, 1¼" cotton	lb.	.47
23/5/3 Combed Egyptian	lb.	.47

Leno Breaker

8¼ ounce and 10¼ ounce 60" Karded peeler	lb.	.47

THE March cotton market ruled quiet as the trade awaited final outcome of Congressional action to limit Commodity Credit Corp. sales of commodities, and other legislative developments. The fluctuations were generally within narrow limits as reflected in the ⅞-inch spot middling price, which dropped from 20.24¢ per pound February 28 to 20.15¢ on March 9, climbed to 20.36¢ March 18 and closed at 21.24¢ March 30.

The daily rate of domestic raw cotton consumption reached a record high of 45,300 bales in February, according to Bureau of the Census reports. Because of fewer working days the total consumption for the month of 893,745 running bales was lower than the January total of 945,909 bales. Consumption for the first seven months of the current season was placed at 6,280,108 bales, against 6,216,874 for the same period in 1940-41. It is expected that the 11,000,000-bale estimate for the season will be attained. Stocks in consuming establishments February 28 were 2,579,783 bales, compared with 2,495,186 on January 31 and 1,906,835 on February 28, 1941. Stocks in public storage and at compresses were 12,213,134 bales February 28, against 12,857,321 on January 31 and 14,045,487 on February 28, 1941. Total ginnings for this season were placed at 10,488,885 running bales, against 12,297,970 bales last season, in a preliminary report of the Bureau of the Census.

It is expected that the government request for planting up to the full 1942 cotton allotment of 27,400,000 acres will stimulate the indicated upward trend of growers' plans tabulated at 23,595,000 acres before the government request was announced. The planted acreage reported for the last season was 23,250,000 acres.

WPB General Preference Order M-92, designed to increase the production of long staple SXP cotton for balloon cloth and other aviation uses, issued and effective February 20, prohibits oil mills or cotton gins in Texas, New Mexico, and Arizona from selling or using any SXP cotton seed until it has been inspected by a Department of Agriculture representative to determine whether the seed is suitable or unfit for planting. Seed found fit for planting may not be crushed and may be sold only for planting purposes. It is reported that the price of 42¢ a pound for top grade 1 3/32-inch length SXP cotton produced this year will be guaranteed the producer by the CCC and that all grades of this cotton have been raised 5¢ a pound.

The CCC announced that it would sell 210,969 bales of cotton to the trade in March. Bids were received for more than 600,000 bales.

Fabrics

Sales of cotton grey goods in March were reportedly close to production in an active fabrics market. A large part of the print cloth business was on government priorities with limited yardage for civilian use. Sheetings were scarce. There were unconfirmed reports of large government orders of osnaburgs early in the month, but trade in this cloth ruled quiet later. Demand for ducks and drills was in good volume. Insofar as future production of these wide heavy cloths is obtainable contracts are now being made for midsummer delivery. Apparently some progress has been made in government recognition of the cost problems of carpet mills making duck. Price difficulties have slowed production of this fabric by carpet mills, but recently such mills have booked large orders.

WPB Order M-91, issued March 6, prohibits purchase of cotton duck without a priority rating better than A-2. An amendment to WPB Order M-19, effective March 1, restricts the use of chlorine in textile bleaching to 50% of the amount used in the year ending June 30, 1941.

The war activities committee of the Association of Cotton Textile Merchants urged on March 11 that all textile mills allocate at least 50% of cloth production to contracts bearing an approved preference rating. Estimates indicate that about 35% of the total cotton cloth output will be purchased by government agencies in 1942 compared with 19% in 1941. It was reported that many mills believe cotton values, and therefore sliding-scale cloth prices, have become fairly stable, and it appeared that excess yardage might be sold with less consideration of possible upward trends in cotton prices.

Tire fabrics are up 1¢ per pound, but other prices are firm as a result of ceiling influences. A continuance of heavy demand is expected by the trade with few sales for early delivery. Speculation which might influence prices under such circumstances is being sharply restrained.

PACIFIC COAST

Philip H. Drew, chief chemist at Goodyear's Los Angeles, Calif., plant recently addressed the Southern California Section of the Society of Automotive Engineers on "Facts about the Rubber Situation", with emphasis on substitutes.

Pomona Pump Co., Pomona, Calif., has purchased the Westco Pump Division of Micro-Westco, Inc., Bettendorf, Iowa, which it will operate as Pomona Pump Co., Westco Division, 2621 Locust St., St. Louis, Mo.

E. M. Smith Co., 639 S. Clarence St., Los Angeles, Calif., because of its close association with the word Grizzly in advertising copy and trade names of the mechanical goods it makes, according to Vice President Walter G. Smith, has changed its name to the Grizzly Mfg. Co., but has made no change in management, personnel, or policy. As the firm's business increased, it became necessary to have an additional plant, devoted to automotive products, which is now at Paulding, O.

"SIGHTED SUB—SANK SAME" . . . This recent radio report coming from one of our naval patrol planes represents today's version of Perry's famous line, "We have met the enemy and they are ours."

The vast expansion of our naval air forces as well as the mounting orders for barrage balloons naturally call for the use of much cotton fabric. Cotton duck as well as cotton airplane cloth and balloon cloth, drills, twills and huck and terry toweling all play an important part in the equipment and protection of our armed forces.

Because so much of our entire duck production is under mandatory priority for Army and Navy requirements, your normal supplies of this material will be curtailed during the present emergency.

WELLINGTON SEARS COMPANY • 65 Worth Street, New York, N. Y.

Cottons FOR DEFENSE...WELLINGTON SEARS FOR *Cottons*

State Quotas for New and Retreaded Tires and Tubes during March, 1942

States	Passenger Cars, Motorcycles, and Light Trucks: New Tire Quota	Passenger Cars, Motorcycles, and Light Trucks: New Tube Quota	Trucks and Buses: New Tire Quota	Trucks and Buses: New Tube Quota	Trucks and Buses: Truck Retread Quota
Alabama	1,766	1,478	4,432	4,981	1,907
Arizona	621	520	1,488	1,672	640
Arkansas	1,126	942	3,027	3,403	1,196
California	7,617	6,376	18,261	20,524	7,859
Colorado	1,183	990	2,782	3,127	1,197
Connecticut	1,393	1,166	3,297	3,706	1,419
Delaware	227	190	589	662	254
District of Columbia	619	518	1,603	1,802	690
Florida	2,473	2,070	6,260	7,036	2,694
Georgia	2,517	2,107	6,348	7,135	2,732
Idaho	471	394	1,064	1,196	458
Illinois	5,724	4,791	14,539	16,341	6,257
Indiana	2,929	2,452	7,450	8,373	3,206
Iowa	2,351	1,968	5,933	6,668	2,553
Kansas	1,898	1,589	4,473	5,027	1,925
Kentucky	1,454	1,217	3,822	4,296	1,645
Louisiana	1,722	1,441	4,354	4,894	1,874
Maine	569	476	1,215	1,364	521
Maryland	1,341	1,122	3,506	3,940	1,509
Massachusetts	2,847	2,383	6,747	7,583	2,904
Michigan	4,230	3,541	9,717	10,923	4,183
Minnesota	1,932	1,617	4,306	4,840	1,853
Mississippi	1,192	998	2,984	3,354	1,284
Missouri	3,011	2,520	7,721	8,678	3,323
Montana	541	453	1,250	1,405	538
Nebraska	1,217	1,019	2,819	3,168	1,213
Nevada	221	185	523	588	225
New Hampshire	376	315	894	1,005	385
New Jersey	2,929	2,452	7,698	8,652	3,313
New Mexico	581	486	1,343	1,509	578
New York City	2,757	2,307	6,211	6,980	2,673
New York (other than New York City)	5,133	4,297	12,462	14,007	5,364
North Carolina	2,793	2,338	7,056	7,930	3,036
North Dakota	468	392	993	1,116	427
Ohio	5,435	4,549	13,990	15,724	6,021
Oklahoma	2,407	2,015	5,528	6,213	2,379
Oregon	1,313	1,099	3,038	3,414	1,308
Pennsylvania	6,683	5,594	17,270	19,410	7,433
Rhode Island	529	443	1,262	1,418	543
South Carolina	1,402	1,173	3,536	3,974	1,522
South Dakota	519	434	1,216	1,367	523
Tennessee	2,031	1,700	5,103	5,735	2,196
Texas	7,652	6,405	18,399	20,678	7,919
Utah	561	470	1,314	1,477	566
Vermont	275	230	671	754	289
Virginia	1,887	1,579	5,001	5,620	2,153
Washington	1,563	1,308	3,699	4,157	1,592
West Virginia	1,134	949	2,974	3,343	1,280
Wisconsin	1,881	1,574	4,413	4,960	1,899
Wyoming	261	218	594	668	256
Alaska	30	25	70	79	30
Hawaii	243	203	615	691	265
Puerto Rico	611	511	363	408	156
Virgin Islands	11	9	48	48	12
Panama Canal Zone	44	37	112	126	48
Total	104,701	87,635	256,385	288,149	110,225

Prices for Footwear

(*Continued from page* 46)

terminated by any maximum price regulation or order issued under the Emergency Price Control Act of 1942.

13. It is understood by the parties hereto that in the event of a breach of this agreement there is no adequate remedy at law to protect the public interest, and, therefore, the provisions hereof are enforceable by an action for specific performance.

14. This agreement, in addition to being for the benefit of the general public, is entered into by the Price Administrator specifically on behalf of the purchasers or prospective purchasers of waterproof rubber footwear, and it is the intention of the parties hereto to invest such purchasers or prospective purchasers with all the rights hereunder.

In witness whereof, the parties hereto have caused this agreement to be signed in triplicate this ..... day of ....., 1942.

Firm Name .....

Address .....

By .....

Title .....

LEON HENDERSON
Price Administrator

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
Bold face type $1.25 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.00 per line (eight words)

Allow nine words for keyed address. *Replies forwarded without charge*

SITUATIONS WANTED

RUBBER TECHNOLOGIST, FAMILIAR WITH PROCESSING, COMpounding, and testing of rubber and synthetic products. Eight years of experience. Excellent theoretical background. Consider position as superintendent in a small well-established company. Address Box No. 395, care of INDIA RUBBER WORLD.

POSITION WANTED: EXPERIENCED RUBBER CHEMIST, analytical, slab testing, compounding, and development. Address Box No. 404, care of INDIA RUBBER WORLD.

PRODUCTION MANAGER, NOW EMPLOYED, DESIRES NEW connections. Capable technical superintendent. 20 years' experience in development and production of mechanical, sponge and synthetic rubber products. Familiar with all phases of manufacture. Especially competent in production of products made from reclaimed rubber. Address Box No. 405, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITIES

NATIONAL MANUFACTURING AND SELLING ORGANIZATION doing several million dollars annually, now catering to department and chain stores, is interested in acquiring patents and processes of products that do not require drastic equipment changes. Entirely open-minded, but especially interested in emulsions or dispersions as substitutes for rubber and/or latex and suitable for dipping on forms. Address Box No. 399, care of INDIA RUBBER WORLD.

RUBBER FACTORY, SALE OR RENT, METROPOLITAN AREA. 60" calendar, 2 mills, tubing machine, horizontal vulcanizer, incidental equipment. Reasonable. Address Box No. 402, care of INDIA RUBBER WORLD.

Jack Baron, son of Sam Baron, is in Havana and will shortly arrive in this country with a serum that will save 40% on Crude Rubber. Details later.

Where Needs Are Filled

The Classified Ad. Columns of INDIA RUBBER WORLD bring prompt results at low cost.

SITUATIONS OPEN

CHEMIST: FAMILIAR AND EXPERIENCED IN THE MANUFACture of sheet rubber products, rubberized fabrics, pyroxylin coatings, and rubber sundries. Capable of assisting in factory management and production. State experience in full; all communications strictly in confidence. Address Box No. 396, care of INDIA RUBBER WORLD.

SUPERINTENDENT FOR MODERN RUBBER plant employing 250 to 300 people. Must be familiar with production methods, milling, tubing, braiding, lead covering, vulcanizing, and molding. State age, education, experience, present earnings, and salary expected. Address Box No. 397, care of INDIA RUBBER WORLD.

MAN WANTED FOR EXECUTIVE SALES WORK, HARD RUBBER and composition products. Aggressiveness needed. Broad opportunity open. Reply giving full details. Address Box No. 398, care of INDIA RUBBER WORLD.

WANTED: FOREMEN, FORELADIES, EXPERIENCED IN THE production of rubber overshoes, arctics, rubbers, knee and hip boots. Address Box No. 400, care of INDIA RUBBER WORLD.

WANTED: YOUNG CHEMIST WITH SOME EXPERIENCE IN organic chemistry; familiar with rubber industry. Address Box No. 401, care of INDIA RUBBER WORLD.

TECHNICIAN, EXPERIENCED IN MANUFACTURE OF SPONGE rubber wanted for new study. Address Box No. 406, care of INDIA RUBBER WORLD.

CHEMICAL ENGINEER WITH SOLID EXPERIence in rubber plants, progressive and familiar with current developments, who can put thoughts on paper for bulletin and promotion work. Age 35 to 40. Permanent position if qualified. Give nationality and salary desired. Location New York. Address Box No. 408, care of INDIA RUBBER WORLD.

(*Advertisements continued on page 99*)

Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	—January, 1942—		—January, 1941—	
UNMANUFACTURED	Quantity	Value	Quantity	Value
Crude rubber, etc.....lb.	.....	.....	13,522,707	$2,733,673
Latex (dry weight) .....lb.	.....	.....	566,882	166,613
Gutta percha .....lb.	10,088	$8,981	3,448	815
Rubber, recovered .....lb.	2,931,900	214,120	987,500	59,513
Rubber, powdered, and gutta percha scrap .....lb.	435,400	17,043	408,800	9,973
Balata .....lb.	.....	.....	4,461	839
Rubber substitute .....lb.	118,900	32,823	32,600	10,472
Totals	3,496,288	$272,967	15,526,398	$2,981,898
PARTLY MANUFACTURED				
Hard rubber comb blanks....	.....	$375	.....	$4,187
Hard rubber, n. o. s.....lb.	1,376	1,959	4,420	3,766
Rubber thread not covered.lb.	.....	.....	3,282	2,497
Totals	1,376	$2,334	7,702	$10,450
MANUFACTURED				
Bathing shoes .....prs.	.....	.....	2,710	$474
Belting	.....	$19,053	.....	13,751
Hose	.....	28,037	.....	43,599
Packing	.....	15,009	.....	7,144
Boots and shoes .....prs.	246	561	91	54
Canvas shoes with rubber soles .....prs.	.....	.....	1,060	370
Clothing, including waterproofed	.....	3,166	.....	3,829
Raincoats .....no.	6,543	37,686	1,733	3,964
Gloves .....doz. prs.	651	1,493	587	1,269
Hot water bottles	.....	100	.....	247
Liquid sealing compound....	.....	.....	.....	2,833
Tires, bicycle .....no.	589	427	736	764
Pneumatic .....no.	141	1,900	992	16,988
Solid for automobiles and motor trucks .....no.	89	6,151	37	1,007
Other solid tires.....	.....	533	.....	2,208
Inner tubes .....no.	15	77	686	1,878
Bicycle .....no.	627	174	1,375	290
Mats and matting	.....	9,384	.....	9,828
Cement	.....	17,729	.....	8,080
Golf balls .....doz. prs.	2,088	4,472	714	1,552
Heels .....prs.	3,351	247	6,452	321
Other rubber manufactures..	.....	200,317	.....	223,620
Totals	.....	$346,516	.....	$344,070
Totals, rubber imports..	.....	$621,817	.....	$3,336,418

Exports of Domestic and Foreign Rubber Goods

UNMANUFACTURED	Produce of Canada Value	Reexports of Foreign Goods Value	Produce of Canada Value	Reexports of Foreign Goods Value
Crude rubber	.....	.....	.....	.....
Waste rubber	$12,002	.....	$17,589	.....
MANUFACTURED				
Belting	$3,309	.....	$28,519	.....
Bathing caps	22	.....	77	.....
Canvas shoes with rubber soles.	18,152	.....	22,142	.....
Boots and shoes	105,553	.....	92,871	.....
Clothing, including waterproofed	16,913	.....	19,306	.....
Heels	2,163	.....	838	.....
Hose	11,321	.....	269,160	.....
Soles	1,209	.....	1,023	.....
Soling slabs	.....	.....	212	.....
Tires, pneumatic	894,665	.....	343,031	.....
Not otherwise provided for..	38,122	.....	9,422	.....
Inner tubes	63,594	.....	42,564	.....
Other rubber manufactures..	6,639	.....	25,657	.....
Totals	$1,161,662	.....	$854,822	.....
Totals, rubber exports...	$1,173,664	.....	$872,411	.....

Rubber Trade Inquiries

The inquiries below are of interest not only in showing the needs of the trade, but because additional information may be furnished by readers. The Editor is glad to have those interested communicate with him.

NO.	INQUIRY
2868	Manufacturers of inflatable rubber air mattresses.
2869	Manufacturer of blue paint for windows of buildings where material is being joined with rubber cement.
2870	Manufacturers of equipment to repair rubber footwear.
2871	Manufacturers of calenders.
2872	Manufacturer of a machine that will either braid or weave asbestos on wire into a braid up to 14 inches wide by 1¾ inches thick.
2873	Manufacturers of cleaners for rubber molds.
2874	Manufacturers of machinery for making square-cut rubber thread.
2875	Manufacturers of rubber mangles or rubber hand mills.
2876	Suppliers of equipment for vulcanizing patches on and repairing fully vulcanized rubber or latex sheet.

Classified Advertisements

Continued

MACHINERY AND SUPPLIES FOR SALE

FOR SALE: 1—Watson-Stillman Hydro-Accumulator; 20 Hydraulic Presses, 12x12 up to 38x78; Pumps and Accumulators; 9x18" Mill also 15x36, 16x42, 18x50; 1—Royle 5½ Tuber; other Hydraulic Pumps, Hydraulic Presses, Tubers, Calenders, Vulcanizers, etc. CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, New York, N. Y.

FOR SALE: Mikro Pulverizers; W. & P. Mixers; Brighton 80 gal. Change Can Mixers; Pony Mixers; Driers, etc. Cash Buyers of your surplus equipment—from single items to complete plants. BRILL EQUIPMENT CORPORATION, 183 Varick Street, New York City.

MACHINERY AND SUPPLIES WANTED

WANTED: 1-FIVE MILL WASHER LINE, USED OR NEW, PREFerence 14"x32" rolls with 8½" diameter necks, complete with or without drive. Address Box No. 403, care of INDIA RUBBER WORLD.

WANTED: 1—Banbury Mixer; 2—Mills; 1—Calender; 5—Hydraulic Presses, with pump and accumulator; 2—Tubers. Address Box No. 407, care of INDIA RUBBER WORLD.

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